

**Summary of Basinwide Habitat Survey Results for Seven Streams on the
Andrew Pickens Ranger District, Sumter National Forest, South Carolina,
2001 - 2002**



United States Department of Agriculture Forest Service
Southern Research Station
Center for Aquatic Technology Transfer

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January 2003

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Introduction

Brook trout (*Salvelinus fontinalis*) are the only native salmonid species of the southern Appalachians. Genetic analysis has shown that northern and southern populations of brook trout are genetically distinct (Hayes et al. 1996, Stoneking et al. 1981) and due to past stocking practices southern Appalachian streams currently contain northern strain, southern strain, and hybrid populations (McCracken et al. 1993). Efforts are currently underway in several southern states to reestablish pure southern strain brook trout populations in streams within their native range (Dawn Kirk and Jeanie Riley, pers. comm.). The U. S. Forest Service, Southern Research Station, Center for Aquatic Technology Transfer (CATT) has been working with resource managers on the Sumter National Forest (SNF) to assess the status of fish populations (Moran et al. 2002) and stream habitat (present report) in streams considered for southern strain brook trout reintroduction.

During summer 2001 and 2002 we conducted stream habitat surveys on streams considered for southern strain brook trout reintroduction within the Andrew Pickens Ranger District, SNF, South Carolina, to quantify stream habitat conditions. In August 2001, we surveyed one stream (King Creek, 4.9 km), and between July and August 2002 we inventoried over 31 km of stream habitat (6 streams and associated tributaries) using Basinwide Visual Estimation Technique (BVET) habitat surveys (Dolloff et al. 1993). We modified standard BVET methods to measure stream habitat parameters as requested by resource managers on the SNF.

The purpose of this report is to describe the current condition of Andrew Pickens Ranger District streams in a format useful to the District managers and the SNF. In addition to providing needed information on habitat conditions in streams considered for southern strain brook trout reintroduction the enclosed report provides baseline stream habitat information for Forest planning, habitat improvement projects, and land use decisions.

Methods

Surveys began at confluences for streams contained within National Forest boundaries and at the downstream USFS boundary for all other streams. Surveys were terminated when we encountered an upstream USFS boundary, or when the wetted channel was less than 1 m average wetted width for a distance of at least 500 m.

Two-stage visual estimation techniques were used to quantify habitat in selected streams (Dolloff et al. 1993). During the first stage habitat was stratified into similar groups based on naturally occurring habitat units including pools and riffles (Armantrout 1998). Glides were identified during the survey but were grouped with pools for data analysis. Runs and cascades were also identified but were grouped with riffles for data analysis.

Habitat in each stream was classified and inventoried by a two-person crew. One crew member identified each habitat unit by type (Table A1), estimated average wetted width, average and maximum

depth, riffle crest depth (RCD), and substrate composition for each habitat unit, and determined if pool substrates were embedded. The length (0.1 m) of each habitat unit was measured with a hip chain. Average wetted width was visually estimated. Average and maximum depth of each habitat unit were estimated by taking depth measurements at various places across the channel profile with a graduated staff marked in 5 cm increments. The RCD was estimated by measuring water depth at the deepest point in the hydraulic control between riffles and pools. The RCD was subtracted from average pool depth to obtain an estimate of residual pool depth. Substrates were assigned to one of nine size classes (Table A2). Dominant substrate (covered greatest amount of surface area in habitat unit) and subdominant substrate (covered 2nd greatest amount of surface area in habitat unit) were visually estimated. Substrate was considered to be embedded if sand, silt, or clay filled the interstitial spaces between larger size substrates over greater than 35% of the surface area of the stream bed in a given habitat unit.

The second crew member classified and inventoried large woody debris (LWD) within the stream channel and recorded data on a Husky fex21¹ data logger. LWD was assigned to one of four size classes (Table A3). Woody debris less than 1 m long and less than 10 cm in diameter were not counted.

The first unit of each habitat type selected for intensive (second stage) sampling (i.e. accurate measurement of wetted width) was determined randomly. Additional units were selected systematically (every 10th habitat unit type for streams >1000 m and every 5th habitat unit type for streams <500 m). The wetted width of each systematically selected habitat unit was measured with a meter tape across at least three transects. In each of the systematically selected (second stage) riffles we also estimated the bankfull stream channel width and riparian widths, and measured channel gradient. We estimated bankfull channel width by measuring the width of the bankfull channel perpendicular to flow (Rosgen 1996). We estimated riparian width by measuring from the edge of the bankfull channel to the intersection with the nearest landform at an elevation of two-times the maximum bankfull depth. Riparian width was recorded for both left and right banks, however these values were grouped together for data analysis. We added the bankfull channel width to the left and right riparian widths to estimate flood-prone area (Rosgen 1996). Gradient was estimated by using a clinometer to site from the downstream to the upstream end of the selected riffle.

We used the ratio of measured to estimated area to develop a calibration ratio, which allowed us to correct visual estimates and estimate stream area with confidence intervals (Hankin and Reeves 1988). BVET calculations were computed with a Microsoft Excel² spreadsheet using formulas found in Dolloff et al. (1993). Data were summarized using Excel spreadsheets and SigmaPlot graphics software.

¹ Husky and fex21 are trademarks of Itronix (UK) Limited*

² Microsoft and Excel are trademarks of Microsoft Corporation*

*use of trade name does not imply endorsement

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Acknowledgements

We would like to thank the U. S. Forest Service Southern Research Station Center for Aquatic Technology Transfer (CATT) summer 2001 and 2002 field crews for collecting all of the data presented in this report. The field crews included Christine Black, Daniel Bell, Margie Brophy, Seth Coffman, Tremayne Godbee, and Aaron Shultz. In addition, we thank Jeanne Riley, the Andrew Pickens Ranger District, and the Sumter National Forest for providing us with assistance and funding for the surveys.

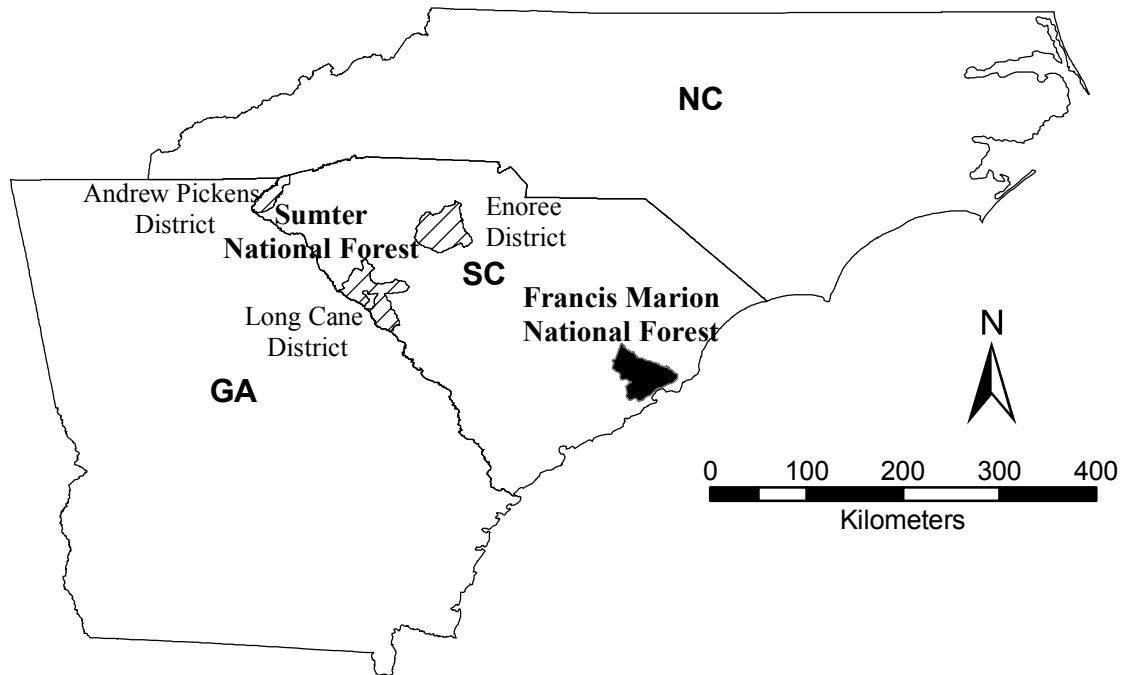
User's Guide

Stream summaries are organized in alphabetical order by stream name. Data for each stream section were collected, analyzed, and presented separately. Each stream or stream section summary contains:

1. several tables summarizing stream characteristics;
2. figures showing frequency of substrate types, area in pools and riffles, average, maximum, and residual depths, and LWD per kilometer;
3. table describing features encountered on the stream;
4. figures showing the distribution of LWD, substrate types, and Rosgen entrenchment ratio.

We also included several summary tables (see 'Summary Tables' section) that summarize all data collected. The tables allow managers to quickly compare habitat between streams.

Survey Area Map



Location of the Andrew Pickens Ranger District, Sumter National Forest, South Carolina. See 'Stream Summary' section for maps of individual stream surveys.

Summary Tables

Survey information and summary of general stream habitat characteristics for streams surveyed using the BVET habitat survey on the Andrew Pickens Ranger District during summer 2001 and 2002. Asterisk indicates value could not be calculated. 'Length' is total survey length, 'Width' is mean bankfull channel width, 'Gradient' is median channel gradient, and 'Temperature' is mean water temperature at the time of the survey.

Stream	Quad	Survey Date	Length (km)	Width (m)	Gradient (%)	Temperature (°C)
Bad Creek	Tamassee & Cashiers	08/01/02	4.0	5	13	17
Tributary 1	Cashiers	08/08/02	1.5	4	10	16
Crane Creek	Tamassee	08/02/02	5.8	4	12	19
Tributary 1	Tamassee	08/06/02	1.8	2	2	12
Tributary 1a	Tamassee	08/07/02	1.2	3	4	17
Indian Camp Branch	Tamassee & Cashiers	07/19/02	2.7	5	4	16
Tributary 1	Tamassee	08/01/02	1.1	3	7	15
Ira Branch	Satolah	08/07/02	3.2	3	5	18
Jacks Creek	Cashiers	07/16/02	2.9	5	5	17
King Creek	Tamassee	08/06/01	4.9	*	2	15
Pigpen Branch	Tamassee	07/16/02	5.0	5	4	16
Tributary 1	Tamassee	07/21/02	1.8	4	26	17
Tributary 2	Tamassee	07/31/02	0.5	2	3	18
Tributary 3	Tamassee	07/20/02	0.3	*	*	*

Summary of pool habitat characteristics for streams surveyed using the BVET habitat survey on the Andrew Pickens Ranger District during summer 2001 and 2002. Asterisk indicates value could not be calculated. 'Total Area (%)' is percent of total stream surface area in pools (includes glides), 'Total Area (m²)' is surface area of stream in pools, 'Mean Area' is mean surface area of individual pools, 'Mean Max Depth' is the mean maximum depth of all pools, 'Mean Ave Depth' is mean average depth of all pools, 'Mean Resid Depth' is mean residual depth of all pools, 'Glides' is percent of pool habitat units surveyed as glides, '>35% Emb' is percent of pools with greater than 35% of substrate materials embedded.

Stream	Total Area	Total Area	Total Count	# per km	Mean Area	Mean Max Depth	Mean Ave Depth	Mean Resid Depth	Glides	>35% Emb
	(%)	(m ²)	(n)		(m ²)	(cm)	(cm)	(cm)	(%)	(%)
Bad Creek	40	4933±225	172	43	29	37	23	9	15	28
Tributary 1	7	225 ± 73	27	18	8	18	10	2	48	4
Crane Creek	29	4602 ± 357	228	39	20	24	14	7	32	42
Tributary 1	11	384 ± 82	43	23	8	13	6	2	63	26
Tributary 1a	17	56 ± *	2	2	28	5	2	*	100	0
Indian Camp Branch	29	2466 ± 177	92	34	27	29	17	9	13	57
Tributary 1	7	139 ± 0	15	14	9	13	7	1	33	73
Ira Branch	21	972 ± 82	88	28	11	19	11	5	51	24
Jacks Creek	29	2125 ± 151	94	32	23	27	16	11	24	62
King Creek	30	5383 ± 602	115	23	47	44	23	5	44	*
Pigpen Branch	31	4770 ± 269	134	27	36	35	20	7	16	13
Tributary 1	19	748 ± 81	64	35	12	22	12	6	58	0
Tributary 2	20	127 ± 6	18	34	7	18	9	3	72	28
Tributary 3	*	* ± *	*	*	*	*	*	*	*	*

Summary of riffle habitat characteristics for streams surveyed using the BVET habitat survey on the Andrew Pickens Ranger District during summer 2001 and 2002. Asterisk indicates value could not be calculated. 'Total Area (%)' is percent of total stream surface area in riffles (includes runs and cascades), 'Total Area (m²)' is surface area of stream in riffles, 'Mean Area' is mean surface area of individual riffles, 'Mean Max Depth' is the mean maximum depth of all riffles, 'Mean Ave Depth' is mean average depth of all riffles, 'Runs' is percent of riffle habitat units surveyed as runs, 'Cascades' is percent of riffle habitat units surveyed as cascades.

Stream	Total Area	Total Area	Count	# per km	Mean Area	Mean Max Depth	Mean Ave Depth	Runs	Cascades
	(%)	(m ²)	(n)		(m ²)	(cm)	(cm)	(%)	(%)
Bad Creek	60	7512 ± 1053	137	34	55	19	9	0	14
Tributary 1	93	3224 ± 370	31	20	104	10	4	0	19
Crane Creek	71	11493 ± 898	204	35	56	12	6	9	12
Tributary 1	89	2846 ± 158	48	26	59	8	4	13	8
Tributary 1a	83	270 ± *	2	2	135	4	2	0	0
Indian Camp Branch	71	6029 ± 472	87	32	69	13	7	2	0
Tributary 1	93	1795 ± 343	29	27	62	9	4	0	10
Ira Branch	79	3663 ± 388	76	24	48	11	5	5	5
Jacks Creek	71	5171 ± 522	96	33	54	13	7	5	6
King Creek	70	12532 ± 2414	204	41	61	26	13	41	22
Pigpen Branch	69	10660 ± 1600	108	22	99	21	9	0	7
Tributary 1	81	3160 ± 493	61	33	52	11	5	0	13
Tributary 2	80	499 ± 96	18	34	28	11	4	0	0
Tributary 3	*	* ± *	*	*	*	*	*	*	*

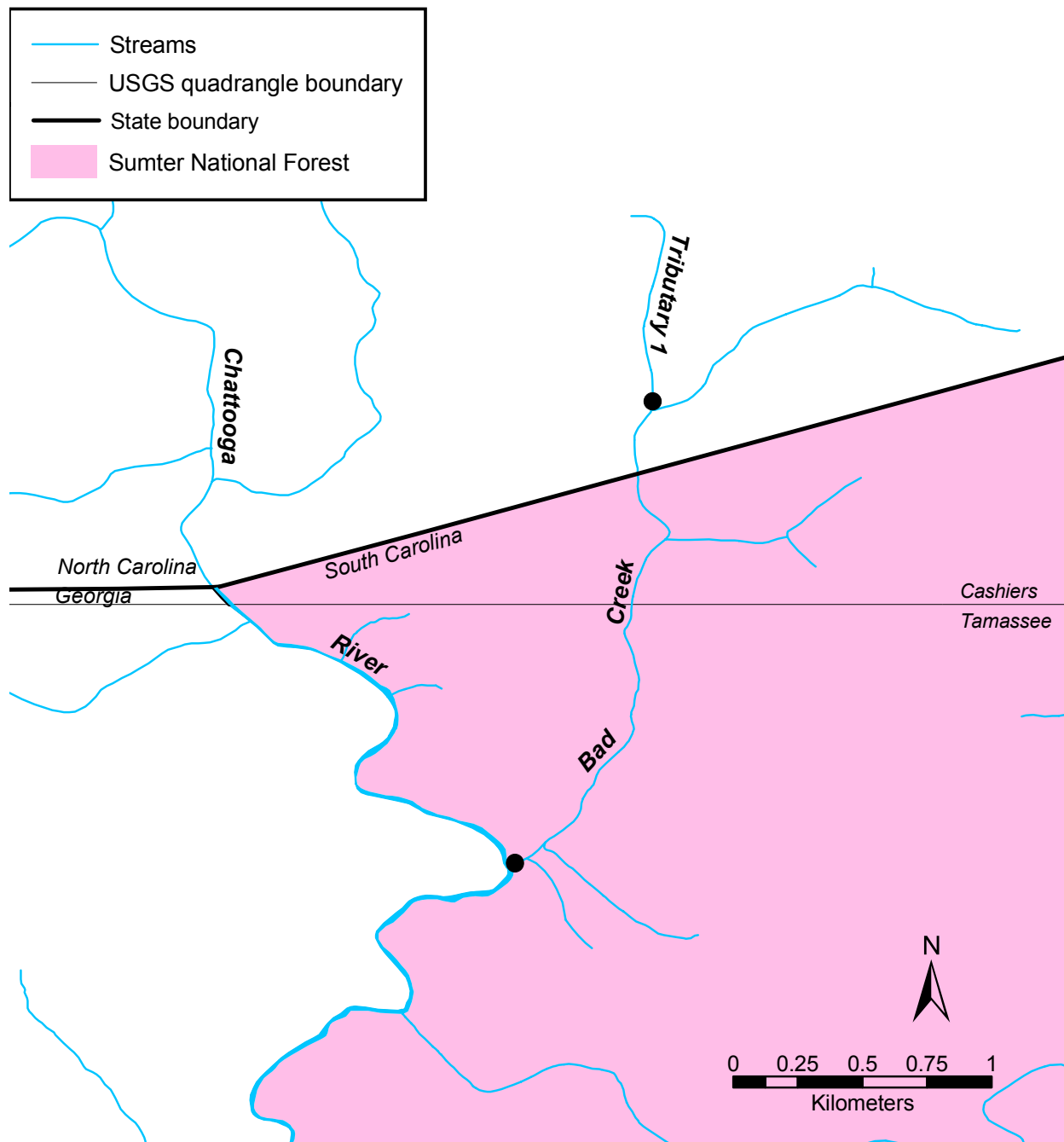
Summary of LWD per km and channel characteristics for streams surveyed using the BVET habitat survey on the Andrew Pickens Ranger District during summer 2001 and 2002. LWD sizes: 1) <5 m long, <55 cm diameter, 2) < 5 m long, >55 cm diameter, 3) >5 m long, <55 cm diameter, 4) >5 m long, >55 cm diameter. 'Riparian Width' is the average distance from the edge of the bankfull channel to the intersection with the nearest landform at an elevation of two-times maximum bankfull depth. 'Bankfull Width' is the mean bankfull channel width. 'Flood Prone Width' is average distance between banks at an elevation of two-times maximum bankfull depth. 'Entrench Ratio' is the mean Rosgen (1996) entrenchment ratio (Table A4).

Stream	Large Woody Debris per km					Riparian Width (m)	Bankfull Width (m)	Flood Prone Width (m)	Entrench Ratio
	1	2	3	4	Total				
Bad Creek	96	13	32	10	151	3	5	12	2.67
Tributary 1	106	19	33	15	173	1	4	7	1.76
Crane Creek	76	1	26	1	104	6	4	15	4.18
Tributary 1	47	0	22	0	69	3	2	7	3.92
Tributary 1a	14	0	6	0	19	1	3	5	1.47
Indian Camp Branch	129	3	87	8	227	4	5	13	2.66
Tributary 1	104	1	47	5	156	4	3	12	4.33
Ira Branch	61	0	31	1	92	4	3	12	3.52
Jacks Creek	96	3	45	6	151	6	5	16	3.87
King Creek	172	6	132	10	318	*	5	*	*
Pigpen Branch	95	11	49	12	167	4	5	13	2.87
Tributary 1	99	2	38	7	146	6	4	17	4.66
Tributary 2	132	2	57	0	191	2	2	6	3.79
Tributary 3	*	*	*	*	*	*	*	*	*

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Stream Summaries



Location of habitat survey starting points (closed circles) for Bad Creek and Bad Creek, tributary 1, summer 2002. The entire area shown is within the Ellicot Rock Wilderness.

Stream:	Bad Creek
District:	Andrew Pickens
USGS Quadrangle:	Tamassee & Cashiers
Survey Date:	08/01/02
Downstream Starting Point:	Confluence with Chattooga River
Total Distance Surveyed (km):	4.0

	Pools	Riffles
Percent of Total Stream Area:	40	60
Total Area (m ²):	4933±225	7512±1053
Correction Factor Applied:	1.05	0.96
Number of Paired Samples:	16	14
Total Count:	172	137
Number per km:	43	34
Mean Area (m ²):	29	55
Mean Maximum Depth (cm):	37	19
Mean Average Depth (cm):	23	9
Mean Residual Depth (cm):	9	--
Percent Surveyed as Glides:	15	--
Percent Surveyed as Runs:	--	0
Percent Surveyed as Cascades:	--	14
Percent with Substrate > 35% Embedded:	28	--

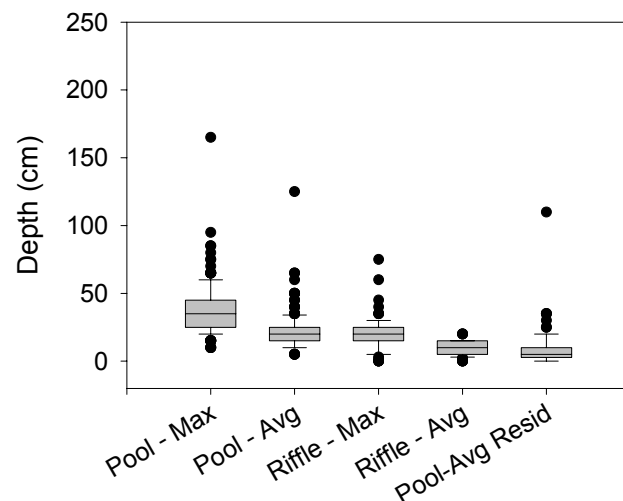
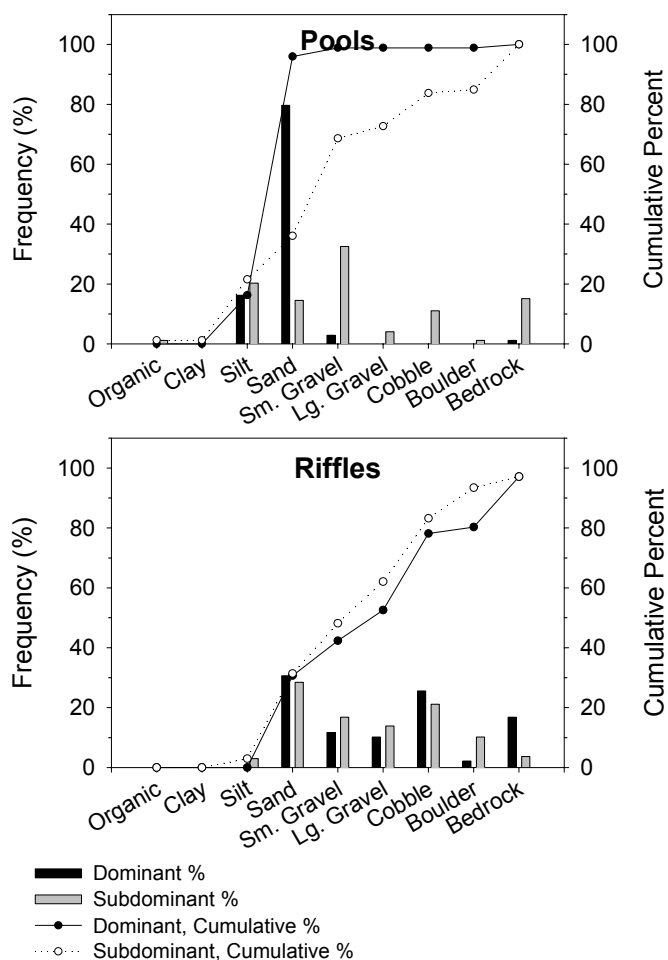
Large Woody Debris Size	Pieces per km
< 5 m long, 10 cm – 55 cm diameter:	96
< 5 m long, > 55 cm diameter:	13
> 5 m long, 10 cm – 55 cm diameter:	32
> 5 m long, > 55 cm diameter:	10
Total:	151

	Riparian Width* (m)	Bankfull Width (m)	Flood Prone Width** (m)	Entrenchment Ratio***	Gradient (%)	Water Temperature (C)
Mean	3	5	12	2.67	14	17
Maximum	12	9	21	5.24	51	17
75 th Percentile	4	6	15	2.96	19	17
Median	3	4	11	2.44	13	17
25 th Percentile	2	3	9	1.88	4	17
Minumum	0	2	7	1.70	2	17
Sample Size	26	13	13	13	21	4

* grouped left and right riparian width together for calculations

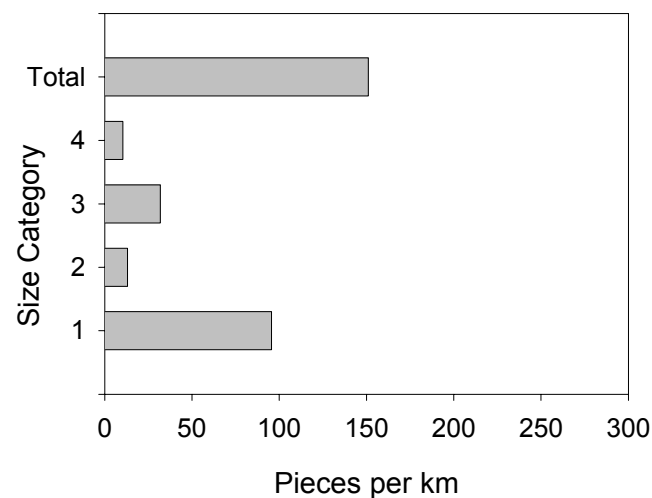
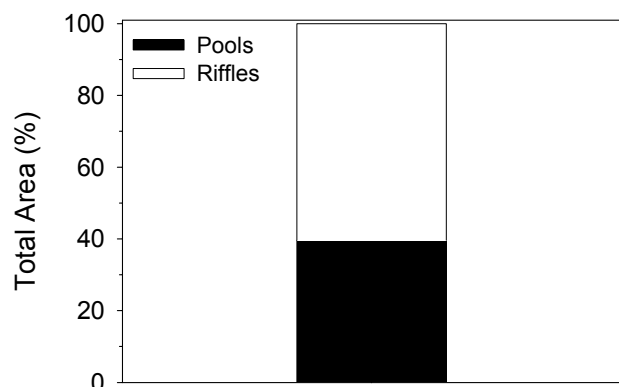
** left riparian, right riparian, and bankfull channel widths were added together for calculations

*** calculated as floodprone width divided by bankfull width



Maximum and average depths and residual pool depths for pools and riffles in Bad Creek, summer 2002. The top and bottom of the boxes represent the 25th and 75th percentiles, the bar in the center of the box represents the median, whiskers represent the 10th and 90th percentiles, and closed circles represent the entire range of the data.

Frequency (percent) and cumulative percent of dominant and subdominant substrate occurrence for pools and riffles in Bad Creek, summer 2002.



LWD per kilometer in bad Creek, summer 2002. Y-axis labels are LWD size classes described below.

Size 1: < 5 m long, 10-55 cm diameter

Size 2: < 5 m long, > 55 cm diameter

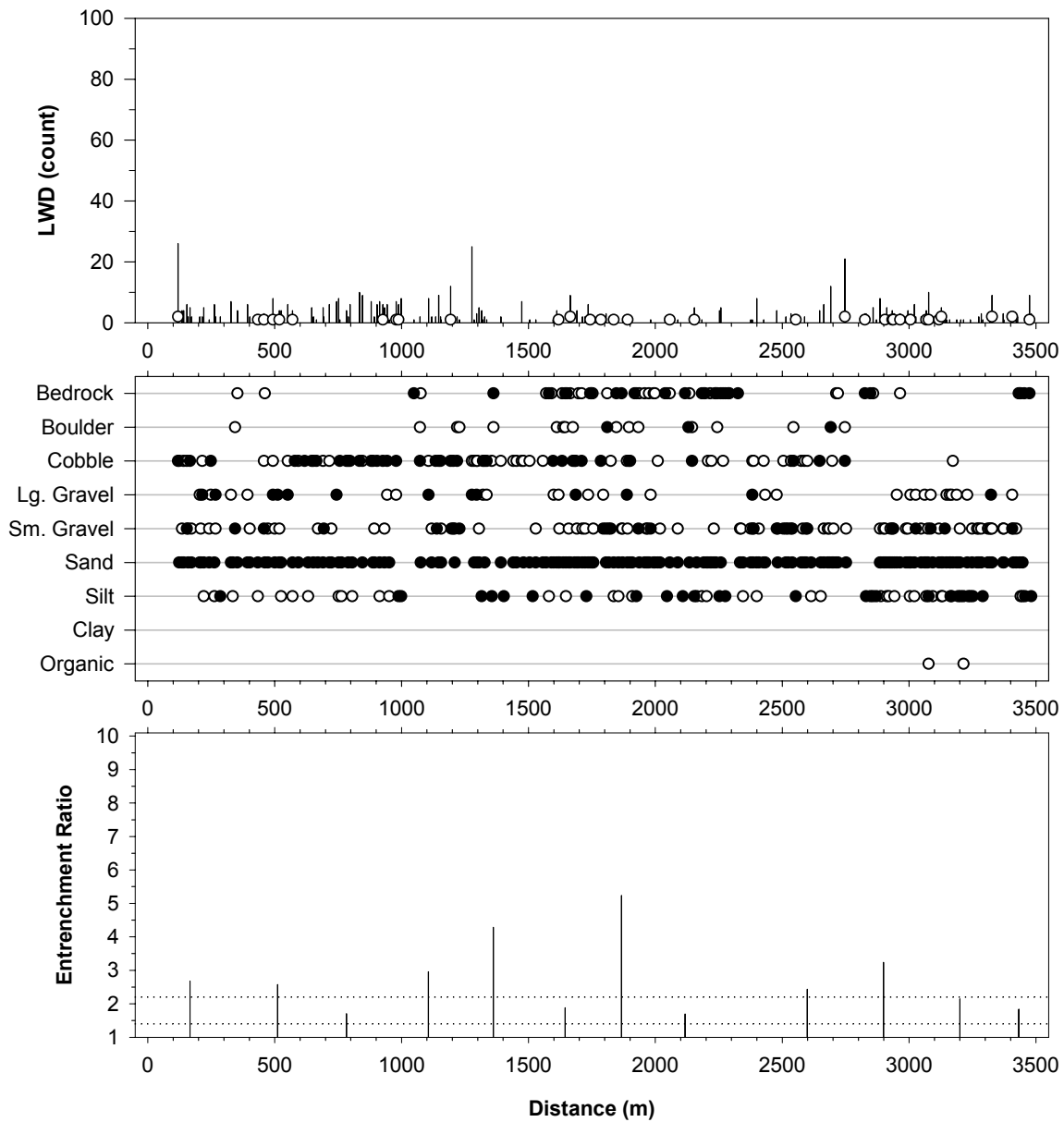
Size 3: > 5 m long, 10-55 cm diameter

Size 4: > 5 m long, > 55 cm diameter

Estimated area of Bad Creek in pools and riffles as calculated using BVET techniques, summer 2002.

Stream features found on Bad Creek during BVET habitat survey, summer 2002. Distance is meters from start of survey.

Stream Feature	Distance (m)	Width (m)	Comments
Tributary	56.4	1.3	on right; trail crossing
Tributary	81.9		on right
Tributary	118.5		on left; intermittent
Side Channel In	153.6		on right
Side Channel Out	171.7		on right
Tributary	178.0	1.0	on right
Seep	411.1		on right; bedrock
Side Channel In	460.0		on right
Side Channel Out	490.3		on right
Side Channel In	504.9		on right
Side Channel Out	548.7		on right
Side Channel In	883.6		on left
Side Channel Out	936.6		on left
Side Channel In	1090.3		on left
Side Channel Out	1146.1		on left
Tributary	1434.1	0.5	on left
Tributary	1595.8	3.0	on right
Side Channel In	1657.2	1.0	on left
Side Channel Out	1670.6		on left
Seep	1866.5		on left
Waterfall	2192.3	3.5	height = 1.8m
Waterfall	2196.6	3.5	height = 1.5m
Tributary	2210.7	1.5	on left
Waterfall	2259.5	1.5	height = 3m
Side Channel In	2571.4		on right
Side Channel Out	2600.9		on right
Waterfall	2796.3	3.0	
Trail Crossing	2884.6		
Side Channel In	2888.2	0.5	on left
Side Channel Out	2912.8		on left
Tributary	3051.9		on left; underground
Seep	3061.4		on right
Tributary	3067.0		on left
Tributary	3051.4	1.5	on left as a shallow flat riffle
Side Channel In	3100.1	1.0	on right
Side Channel Out	3107.1		on right
Side Channel In	3138.6	0.8	on left
Side Channel Out	3163.3		on left
Seep	3167.0	0.5	on left
Side Channel In	3226.7	0.5	on right
Side Channel Out	3241.0		on right
Seep	3261.6	0.3	on right
Tributary	3632.9	0.5	on left
Seep	3671.8	0.5	on left
Seep	3683.4	1.0	on right
Seep	3708.0	0.3	on left
Tributary	3864.3	0.5	on left
Seep	3901.0	0.3	on left



Distribution and abundance of LWD, distribution of substrates, and distribution of Rosgen channel entrenchment in Bad Creek, summer 2002. LWD, and substrate, were recorded for each habitat unit in the stream. Entrenchment measurements were recorded only where calibration measurements (paired samples) were made. X-axis indicates distance upstream from confluence with Chattooga River.

LWD figure: Vertical bars represent total count of LWD (all sizes). Open circles represent the amount of the total LWD that was >5 m in length, >55 cm in diameter (size 4 only).

Substrate figure: Closed circles are dominant substrates, open circles are subdominant substrates. See Appendix A for substrate sizes.

Entrenchment figure: Vertical bars represent entrenchment ratio. Dotted reference lines delineate entrenched (1-1.4), moderately entrenched (1.41-2.2), and slightly entrenched (>2.2) channels. Entrenchment was calculated as floodprone width divided by bankfull width (see Rosgen 1996)..

Stream:	Tributary 1 of Bad Creek
District:	Andrew Pickens
USGS Quadrangle:	Cashiers
Survey Date:	08/08/02
Downstream Starting Point:	Confluence with Bad Creek – note that this survey is for the fork labeled Bad Creek on the quadrangle map, right fork was surveyed as the mainstem
Total Distance Surveyed (km):	1.5

	Pools	Riffles
Percent of Total Stream Area:	7	93
Total Area (m ²):	225±73	3224±370
Correction Factor Applied:	0.93	1.08
Number of Paired Samples:	5	5
Total Count:	27	31
Number per km:	18	20
Mean Area (m ²):	8	104
Mean Maximum Depth (cm):	18	10
Mean Average Depth (cm):	10	4
Mean Residual Depth (cm):	2	--
Percent Surveyed as Glides:	48	--
Percent Surveyed as Runs:	--	0
Percent Surveyed as Cascades:	--	19
Percent with Substrate > 35% Embedded:	4	--

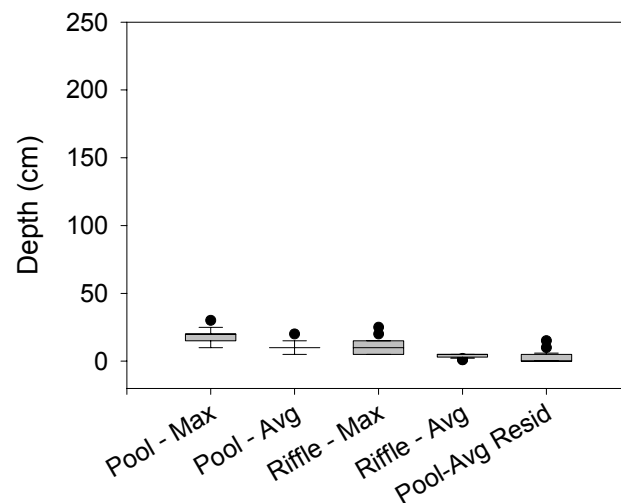
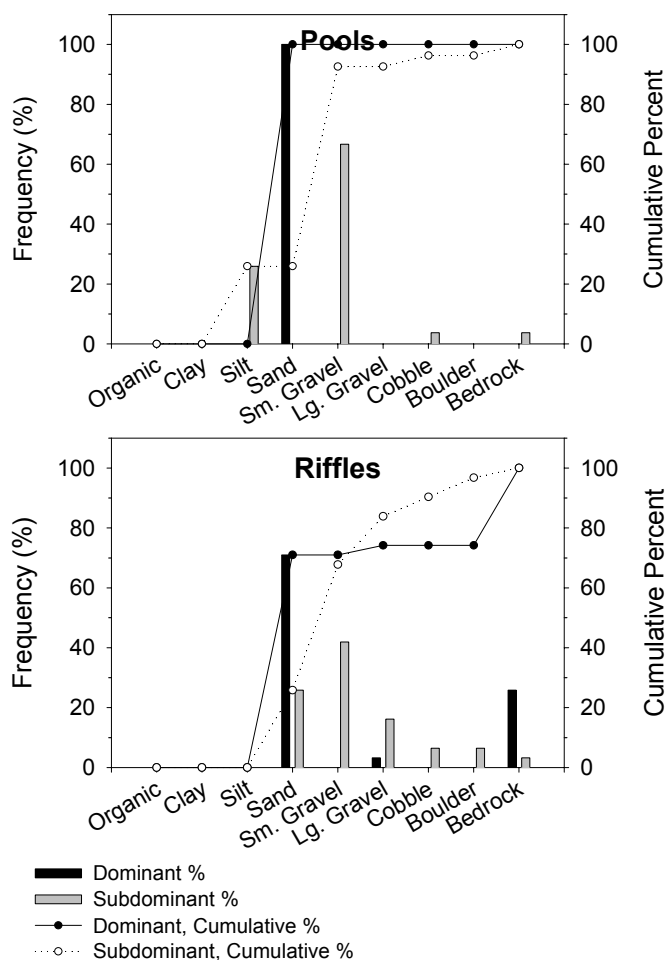
Large Woody Debris Size	Pieces per km
< 5 m long, 10 cm – 55 cm diameter:	106
< 5 m long, > 55 cm diameter:	19
> 5 m long, 10 cm – 55 cm diameter:	33
> 5 m long, > 55 cm diameter:	15
Total:	173

	Riparian Width* (m)	Bankfull Width (m)	Flood Prone Width** (m)	Entrenchment Ratio***	Gradient (%)	Water Temperature (C)
Mean	1	4	7	1.76	14	16
Maximum	3	4	10	2.36	45	16
75 th Percentile	2	4	7	1.75	17	16
Median	1	4	7	1.72	10	16
25 th Percentile	1	4	6	1.64	5	16
Minumum	1	3	5	1.33	4	16
Sample Size	10	5	5	5	8	1

* grouped left and right riparian width together for calculations

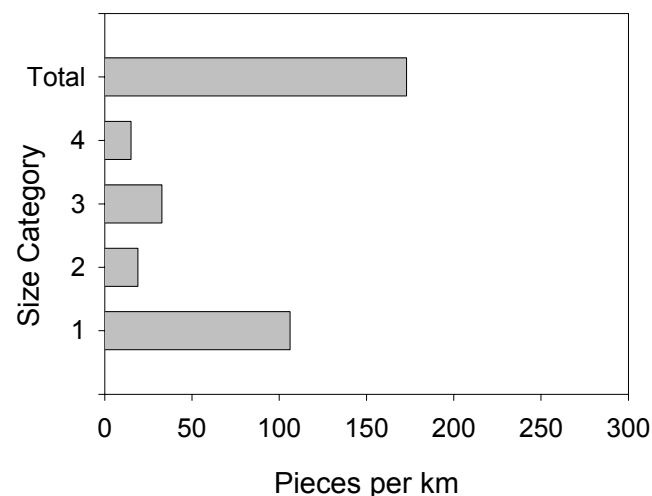
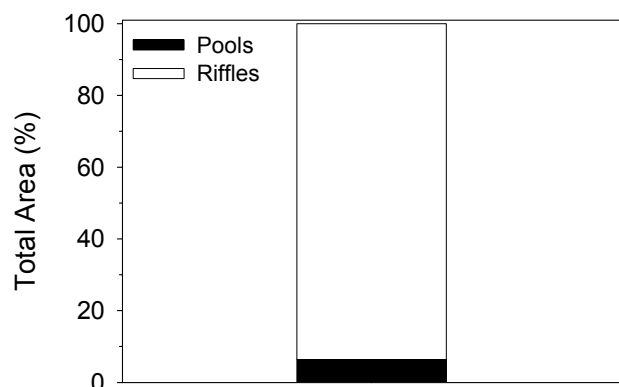
** left riparian, right riparian, and bankfull channel widths were added together for calculations

*** calculated as floodprone width divided by bankfull width



Maximum and average depths and residual pool depths for pools and riffles in Tributary 1 of Bad Creek, summer 2002. The top and bottom of the boxes represent the 25th and 75th percentiles, the bar in the center of the box represents the median, whiskers represent the 10th and 90th percentiles, and closed circles represent the entire range of the data.

Frequency (percent) and cumulative percent of dominant and subdominant substrate occurrence for pools and riffles in Tributary 1 of Bad Creek, summer 2002.



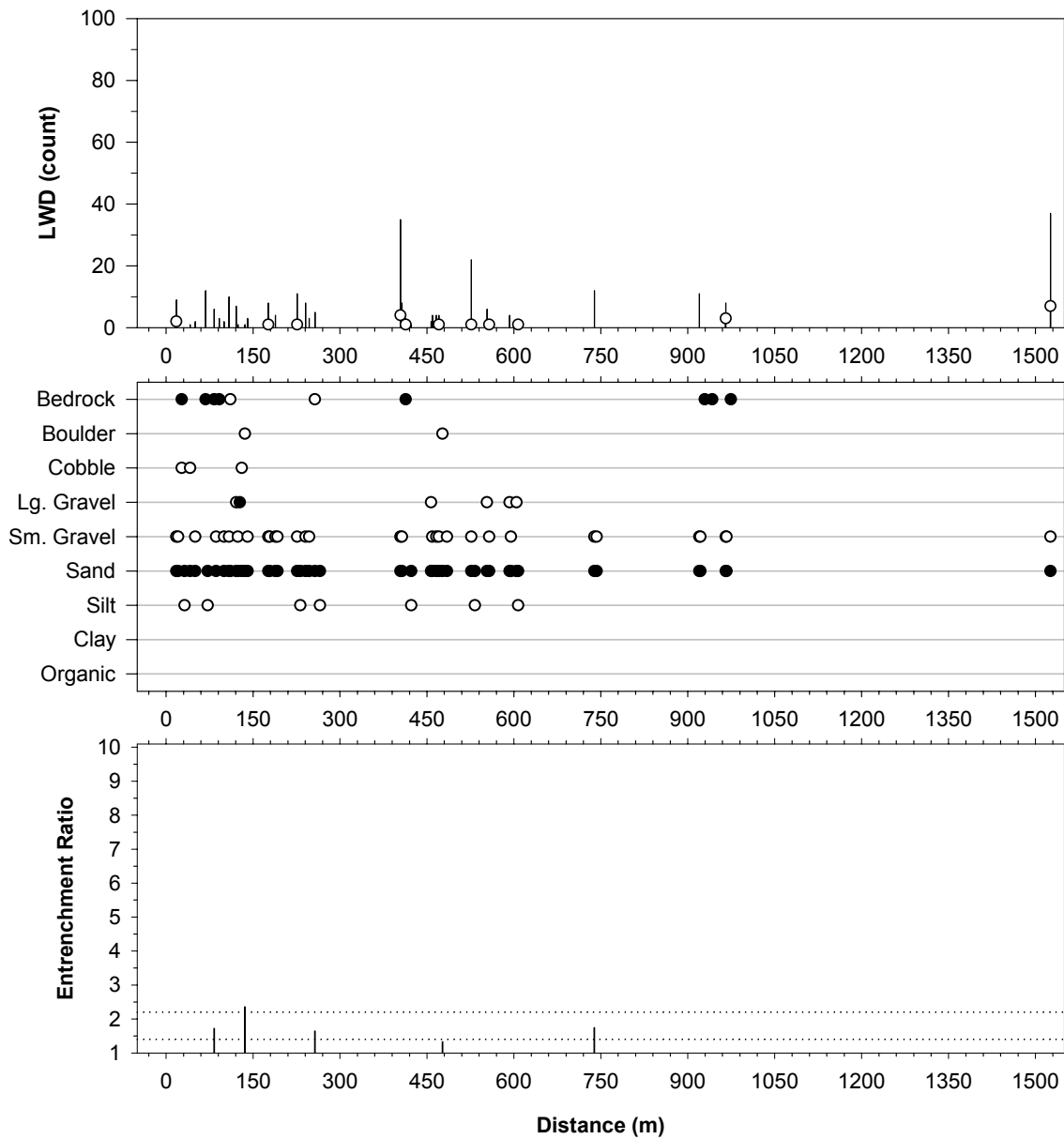
LWD per kilometer in Tributary 1 of Bad Creek, summer 2002. Y-axis labels are LWD size classes described below.

- Size 1: < 5 m long, 10-55 cm diameter
- Size 2: < 5 m long, > 55 cm diameter
- Size 3: > 5 m long, 10-55 cm diameter
- Size 4: > 5 m long, > 55 cm diameter

Estimated area of Tributary 1 of Bad Creek in pools and riffles as calculated using BVET techniques, summer 2002.

Stream features found on Tributary 1 of Bad Creek during BVET habitat survey, summer 2002. Distance is meters from start of survey.

Stream Feature	Distance (m)	Width (m)	Comments
Side Channel In	148.0	0.5	on left
Side Channel Out	162.2		on left
Side Channel In	174.8	0.5	on right
Side Channel Out	184.9		on right
Tributary	324.7	1.0	on left
Side Channel In	348.3	1.0	on right
Side Channel Out	380.7		on right
Side Channel In	426.7	0.5	on left
Side Channel Out	442.0		on left
Tributary	588.2	1.0	on left
Side Channel In	610.9	0.5	on left
Side Channel Out	619.3		on left
Tributary	640.2	2.0	on right; shallow, flat riffle causing an even split.
Tributary	804.5	1.0	on right
Side Channel In	808.4	0.5	on left
Side Channel Out	816.3		on left
Seep	863.8	1.0	on right; flows into previous Side Channel
Tributary	943.2	1.0	on left - underground
Tributary	1156.4		on right; intermittent
Seep	1174.2		on right
Tributary	1231.6	0.8	on left
Seep	1381.7	0.5	on right
Side Channel In	1450.2	0.3	on left

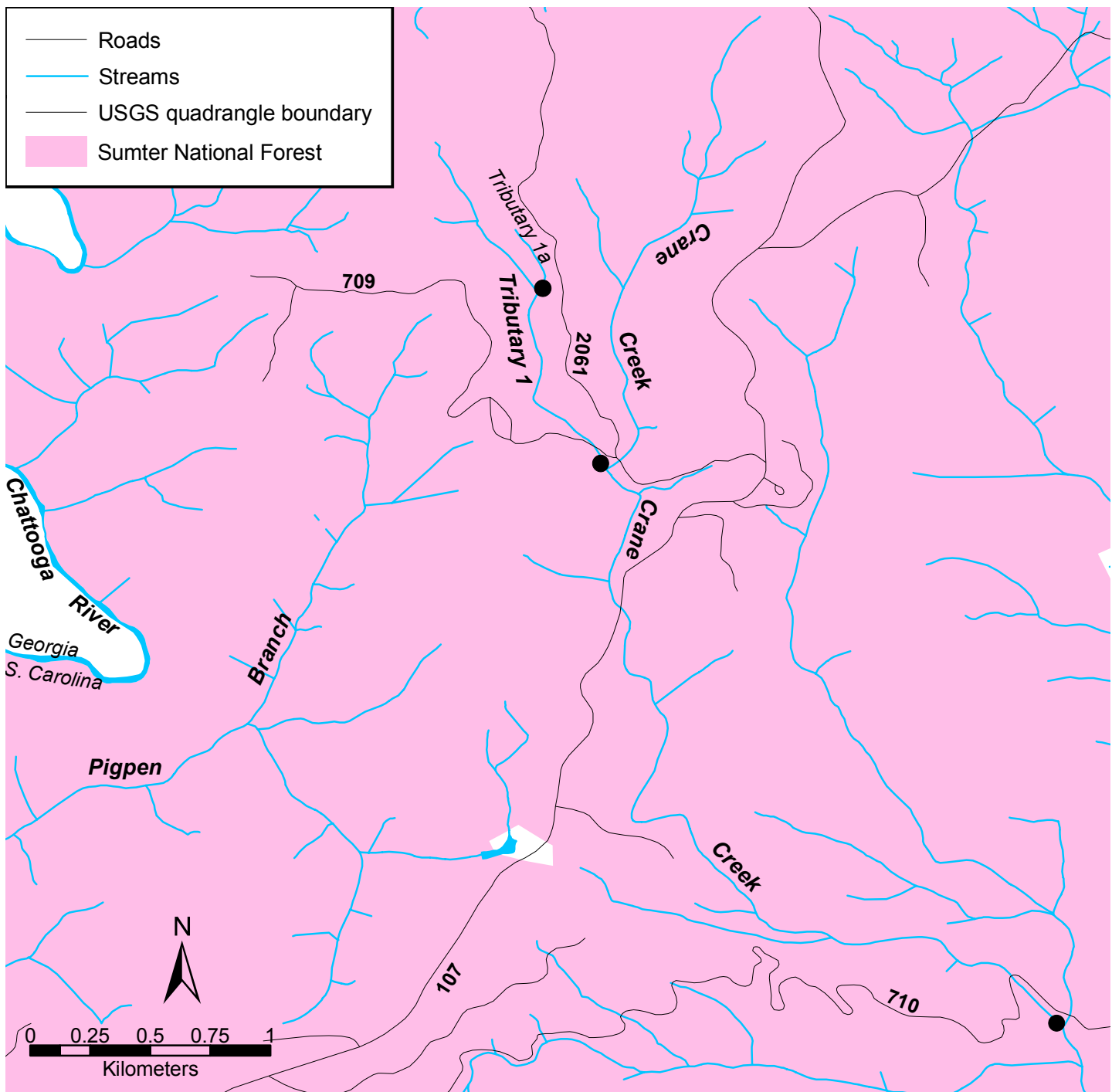


Distribution and abundance of LWD, distribution of substrates, and distribution of Rosgen channel entrenchment in Tributary 1 of Bad Creek, summer 2002. LWD, and substrate, were recorded for each habitat unit in the stream. Entrenchment measurements were recorded only where calibration measurements (paired samples) were made. X-axis indicates distance upstream from confluence with Bad Creek.

LWD figure: Vertical bars represent total count of LWD (all sizes). Open circles represent the amount of the total LWD that was >5 m in length, >55 cm in diameter (size 4 only).

Substrate figure: Closed circles are dominant substrates, open circles are subdominant substrates. See Appendix A for substrate sizes.

Entrenchment figure: Vertical bars represent entrenchment ratio. Dotted reference lines delineate entrenched (1-1.4), moderately entrenched (1.41-2.2), and slightly entrenched (>2.2) channels. Entrenchment was calculated as floodprone width divided by bankfull width (see Rosgen 1996).



Location of habitat survey start points (closed circles) for Crane Creek, Tributary 1 Crane Creek, and Tributary 1a Crane Creek, summer 2002.

Stream:	Crane Creek
District:	Andrew Pickens
USGS Quadrangle:	Tamassee
Survey Date:	08/02/02
Downstream Starting Point:	Confluence with Townes Creek
Total Distance Surveyed (km):	5.8

	Pools	Riffles
Percent of Total Stream Area:	29	71
Total Area (m ²):	4602±357	11493±898
Correction Factor Applied:	1.01	1.05
Number of Paired Samples:	22	19
Total Count:	228	204
Number per km:	39	35
Mean Area (m ²):	20	56
Mean Maximum Depth (cm):	24	12
Mean Average Depth (cm):	14	6
Mean Residual Depth (cm):	7	--
Percent Surveyed as Glides:	32	--
Percent Surveyed as Runs:	--	9
Percent Surveyed as Cascades:	--	12
Percent with Substrate > 35% Embedded:	42	--

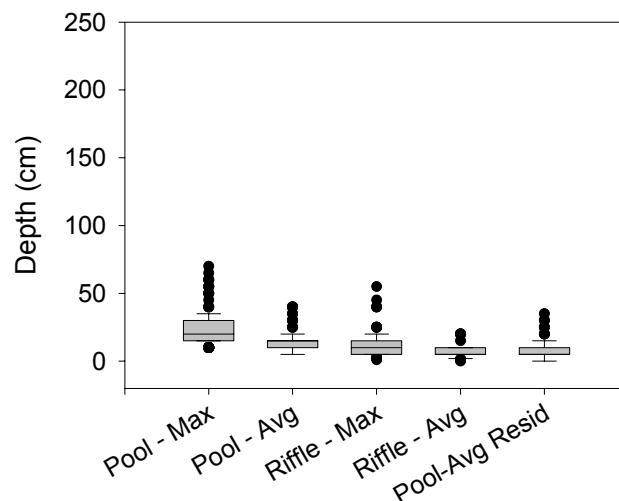
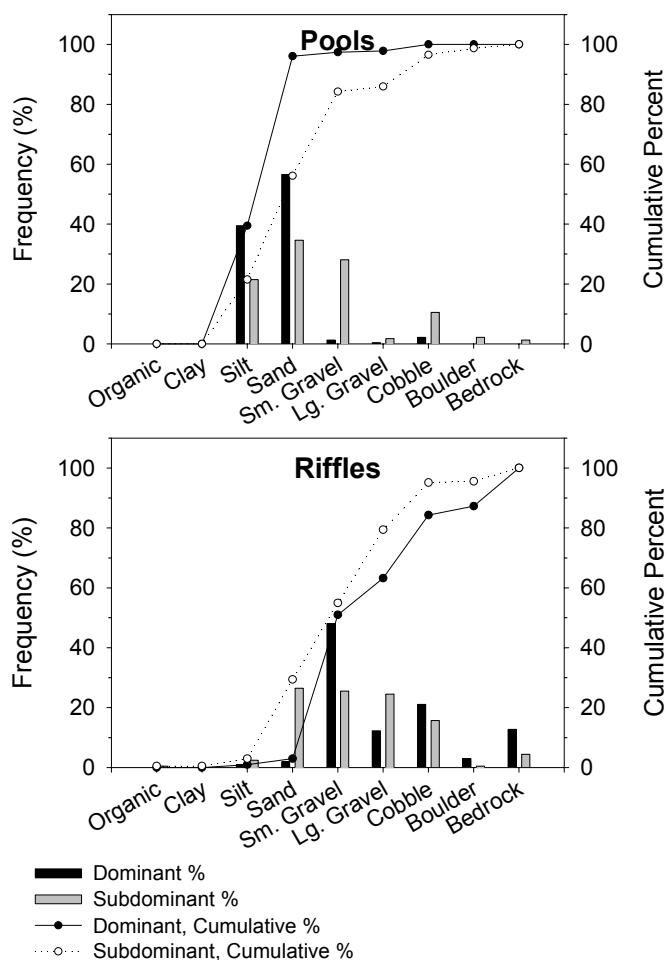
Large Woody Debris Size	Pieces per km
< 5 m long, 10 cm – 55 cm diameter:	76
< 5 m long, > 55 cm diameter:	1
> 5 m long, 10 cm – 55 cm diameter:	26
> 5 m long, > 55 cm diameter:	1
Total:	104

	Riparian Width* (m)	Bankfull Width (m)	Flood Prone Width** (m)	Entrenchment Ratio***	Gradient (%)	Water Temperature (C)
Mean	6	4	15	4.18	18	19
Maximum	32	7	45	13.17	75	23
75 th Percentile	9	4	17	4.04	28	19
Median	2	4	12	2.61	12	19
25 th Percentile	1	3	7	1.74	4	18
Minumum	1	2	4	1.28	3	17
Sample Size	35	18	18	18	39	9

* grouped left and right riparian width together for calculations

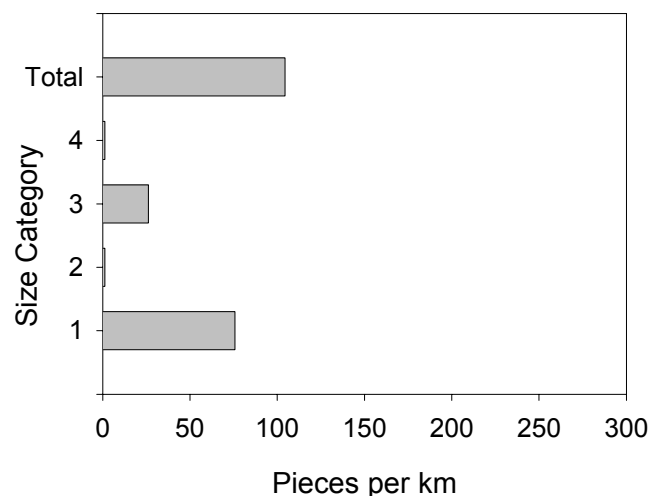
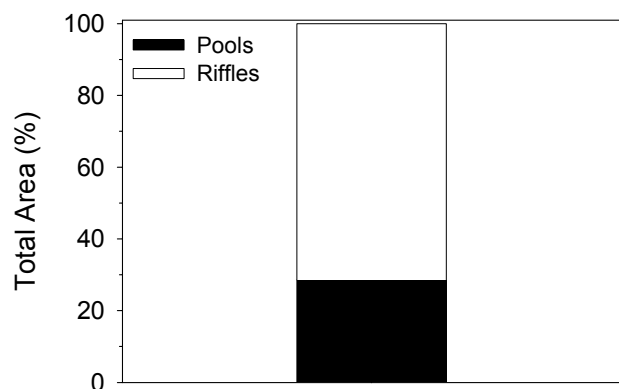
** left riparian, right riparian, and bankfull channel widths were added together for calculations

*** calculated as floodprone width divided by bankfull width



Maximum and average depths and residual pool depths for pools and riffles in Crane Creek, summer 2002. The top and bottom of the boxes represent the 25th and 75th percentiles, the bar in the center of the box represents the median, whiskers represent the 10th and 90th percentiles, and closed circles represent the entire range of the data.

Frequency (percent) and cumulative percent of dominant and subdominant substrate occurrence for pools and riffles in Crane Creek, summer 2002.



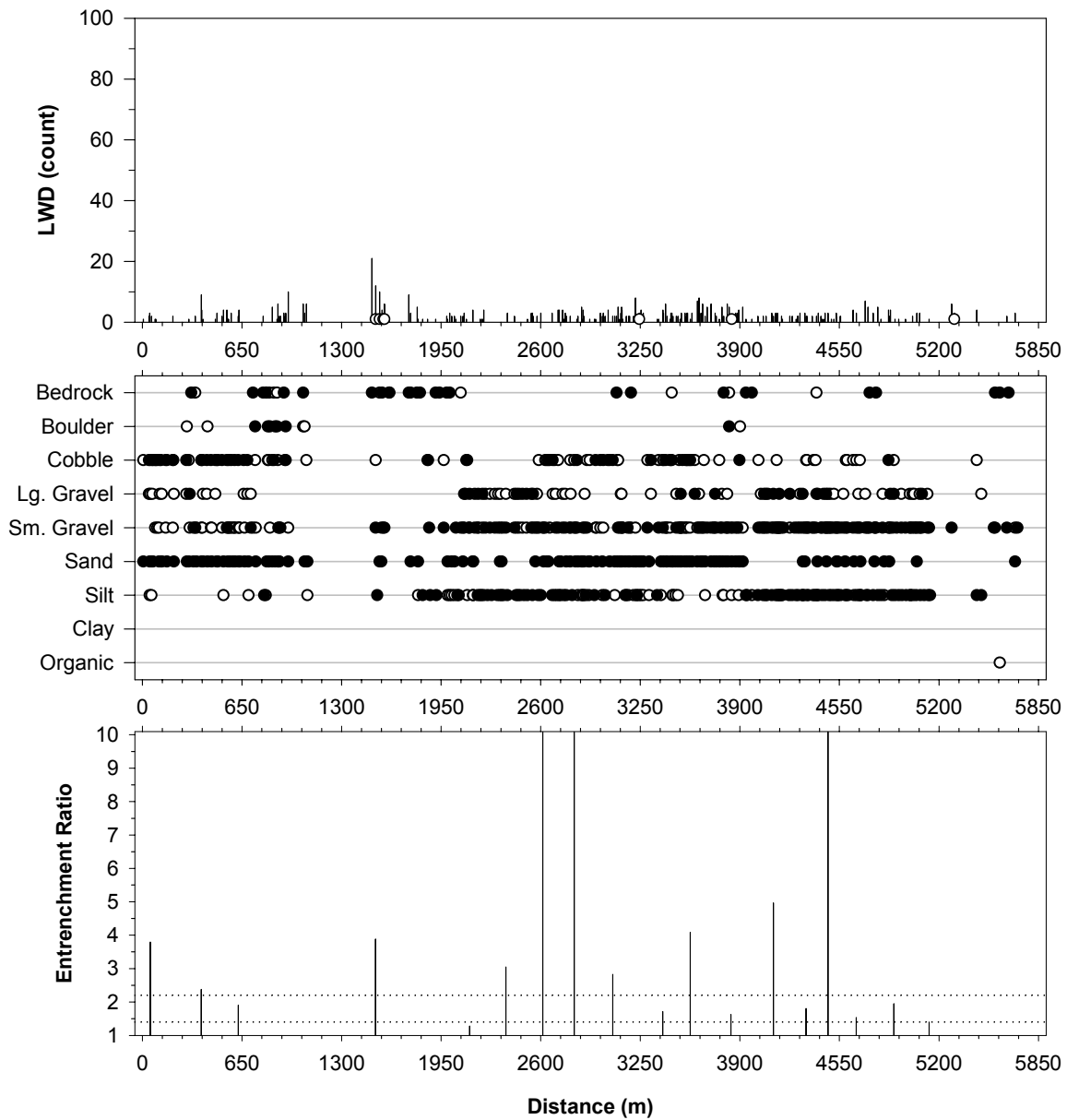
LWD per kilometer in Crane Creek, summer 2002. Y-axis labels are LWD size classes described below.

- Size 1: < 5 m long, 10-55 cm diameter
- Size 2: < 5 m long, > 55 cm diameter
- Size 3: > 5 m long, 10-55 cm diameter
- Size 4: > 5 m long, > 55 cm diameter

Estimated area of Crane Creek in pools and riffles as calculated using BVET techniques, summer 2002.

Stream features found on Crane Creek during BVET habitat survey, summer 2002. Distance is meters from start of survey.

Stream Feature	Distance (m)	Width (m)	Comments
Bridge	297.2	2.0	Winding Stairs Tail Road (FS 710). Bridge has concrete walls and floor, with an opening that is 1.7m tall.
Tributary	330.9	1.0	on left
Tributary	437.8	0.5	on right
Side Channel In	487.2		on right - underground
Side Channel Out	521.2	1.0	on right
Side Channel In	574.2	1.5	on left
Side Channel Out	608.3	0.5	on left
Tributary	484.5	0.5	on left
Side Channel In	963.5	1.5	on left
Side Channel Out	992.5		on left - underground
Tributary	1113.6		on left - estimated distance
Waterfall	1532.0	8.0	height = 30m
Waterfall	1611.4	10.0	height = 4.5m
Waterfall	1750.7	4.0	height = 7m
Tributary	3007.4	0.5	on left
Tributary	3091.0	1.0	on left
Tributary	3326.8	0.5	
Bridge	3329.3		SC 107 road crossing; starts at 3329.3m; ends at 3347.2m; height = 2.5m; while the glide continues under bridge.
Tributary	3468.5	1.0	on left
Trail	3505.5		old road bed/trail.
Seep	3540.0		
Tributary	3655.5	0.5	on right
Tributary	3896.9		on right - underground
Bridge	4048.5		wooden foot trail bridge.
Tributary	4067.0	1.5	on left with an even split, either could be main channel.
Culvert	4184.2		Big Bend road crossing; starts at 4184.2m; ends at 4193m; diameter = 1.2m.
Side Channel In	4232.3		on left - underground
Side Channel Out	4247.8		on left
Tributary	4733.5		on right - dry (possible seep, spring or underground)
Trail	4797.9		old road bed crossing.
Tributary	5169.9	1.0	on right
Tributary	5203.0		on left - underground
Side Channel In	5226.5	1.0	on left
Side Channel Out	5239.0		on left - underground
Tributary	5246.1	1.5	on left
Tributary	5274.5	1.0	on left
Tributary	5517.5		on right - dry



Distribution and abundance of LWD, distribution of substrates, and distribution of Rosgen channel entrenchment in Crane Creek, summer 2002. LWD, and substrate, were recorded for each habitat unit in the stream. Entrenchment measurements were recorded only where calibration measurements (paired samples) were made. X-axis indicates distance upstream from confluence with Townes Creek.

LWD figure: Vertical bars represent total count of LWD (all sizes). Open circles represent the amount of the total LWD that was >5 m in length, >55 cm in diameter (size 4 only).

Substrate figure: Closed circles are dominant substrates, open circles are subdominant substrates. See Appendix A for substrate sizes.

Entrenchment figure: Vertical bars represent entrenchment ratio. Dotted reference lines delineate entrenched (1-1.4), moderately entrenched (1.41-2.2), and slightly entrenched (>2.2) channels. Entrenchment was calculated as floodprone width divided by bankfull width (see Rosgen 1996).

Stream:	Tributary 1 of Crane Creek
District:	Andrew Pickens
USGS Quadrangle:	Tamassee
Survey Date:	08/06/02
Downstream Starting Point:	Confluence with Crane Creek – the left fork at confluence near where Big Bend and Ford Road meet on quad map, note that the upper portion of this stream does not appear on the USGS quadrangle map, see tributary 1a and map included in this report.
Total Distance Surveyed (km):	1.8

	Pools	Riffles
Percent of Total Stream Area:	11	89
Total Area (m ²):	348±82	2846±158
Correction Factor Applied:	0.89	0.97
Number of Paired Samples:	4	5
Total Count:	43	48
Number per km:	23	26
Mean Area (m ²):	8	59
Mean Maximum Depth (cm):	13	8
Mean Average Depth (cm):	6	4
Mean Residual Depth (cm):	2	--
Percent Surveyed as Glides:	63	--
Percent Surveyed as Runs:	--	13
Percent Surveyed as Cascades:	--	8
Percent with Substrate > 35% Embedded:	26	--

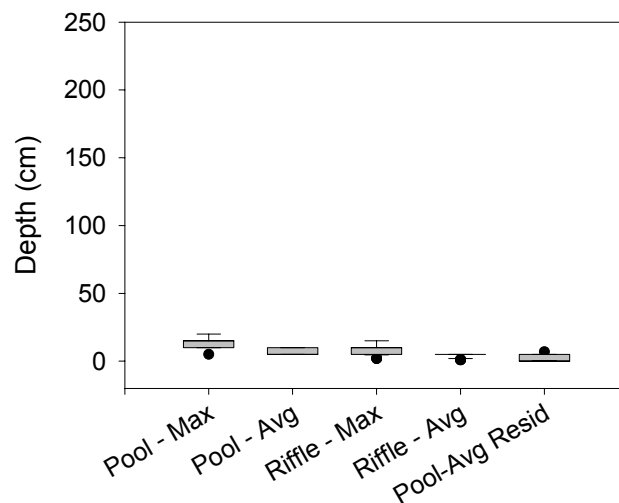
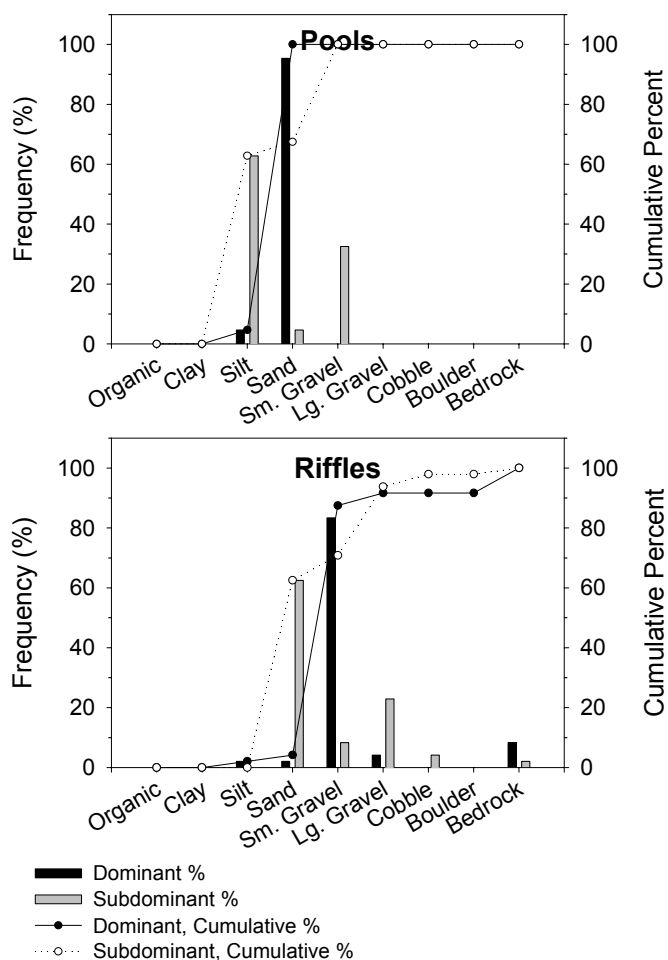
Large Woody Debris Size	Pieces per km
< 5 m long, 10 cm – 55 cm diameter:	47
< 5 m long, > 55 cm diameter:	0
> 5 m long, 10 cm – 55 cm diameter:	22
> 5 m long, > 55 cm diameter:	0
Total:	69

	Riparian Width* (m)	Bankfull Width (m)	Flood Prone Width** (m)	Entrenchment Ratio***	Gradient (%)	Water Temperature (C)
Mean	3	2	7	3.92	9	12
Maximum	9	2	13	7.17	34	30
75 th Percentile	3	2	7	3.42	7	20
Median	3	2	7	3.13	2	4
25 th Percentile	2	1	5	2.94	1	3
Minumum	1	1	5	2.92	0	3
Sample Size	9	9	5	5	5	9

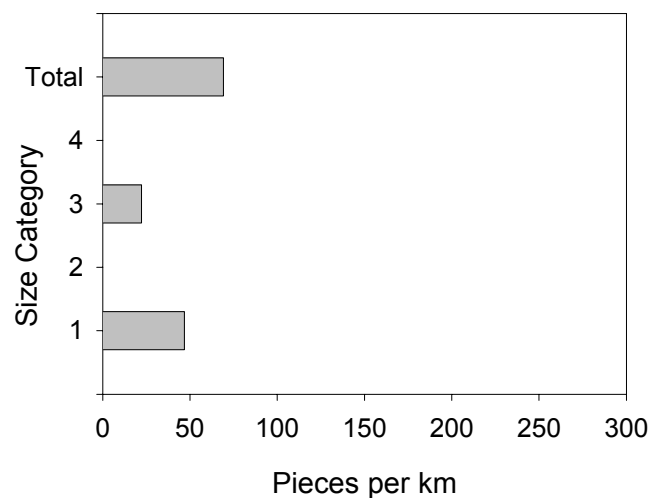
* grouped left and right riparian width together for calculations

** left riparian, right riparian, and bankfull channel widths were added together for calculations

*** calculated as floodprone width divided by bankfull width



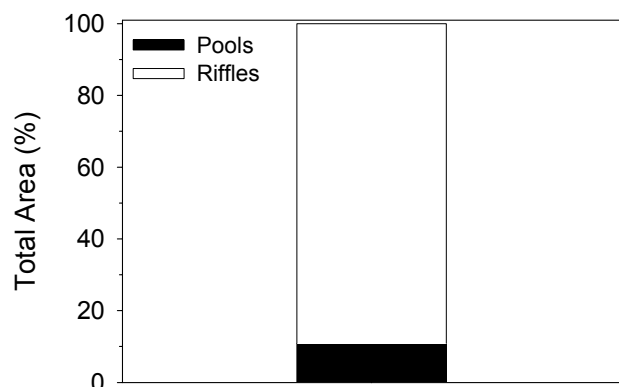
Maximum and average depths and residual pool depths for pools and riffles in Tributary 1 of Crane Creek, summer 2002. The top and bottom of the boxes represent the 25th and 75th percentiles, the bar in the center of the box represents the median, whiskers represent the 10th and 90th percentiles, and closed circles represent the entire range of the data.



LWD per kilometer in Tributary 1 of Crane Creek, summer 2002. Y-axis labels are LWD size classes described below.

- Size 1: < 5 m long, 10-55 cm diameter
- Size 2: < 5 m long, > 55 cm diameter
- Size 3: > 5 m long, 10-55 cm diameter
- Size 4: > 5 m long, > 55 cm diameter

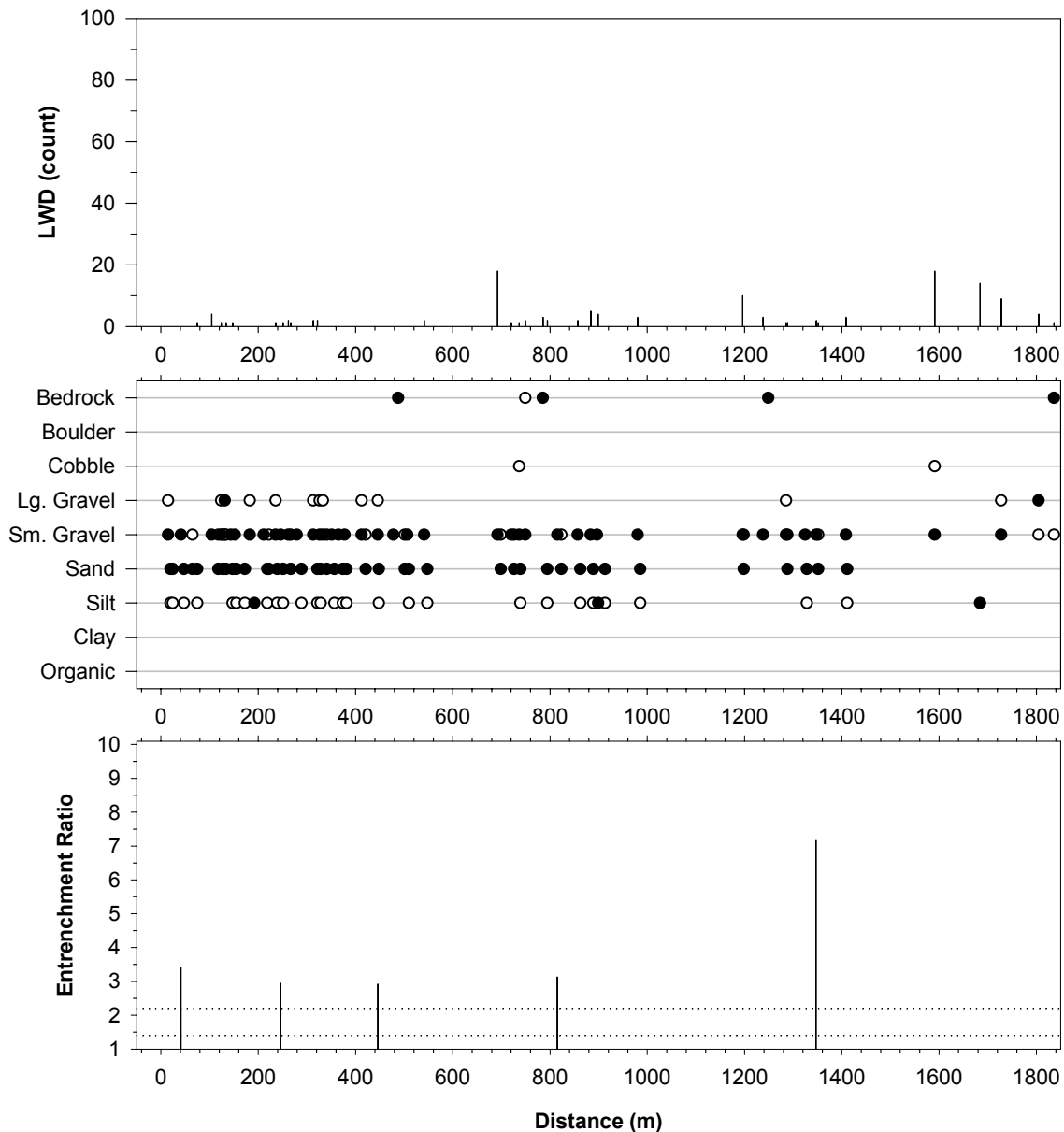
Frequency (percent) and cumulative percent of dominant and subdominant substrate occurrence for pools and riffles in Tributary 1 of Crane Creek, summer 2002.



Estimated area of Tributary 1 of Crane Creek in pools and riffles as calculated using BVET techniques, summer 2002.

Stream features found on Tributary 1 of Crane Creek during BVET habitat survey, summer 2002. Distance is meters from start of survey.

Stream Feature	Distance (m)	Width (m)	Comments
Side Channel In	137.3	1.0	on left
Side Channel Out	142.0		on left - underground
Tributary	143.3	0.5	on left
Culvert	162.7		Big Bend Road Crossing; diameter = 1.5m
Tributary	384.4		on right - underground
Tributary	1033.4	1.0	on right
Tributary	1453.4	1.0	on right
Tributary	1476.9	1.0	on right
Tributary	1765.3		on left
Channel Splits	1804.6	0.5	splits into 3 channels; took left-most channel as the main; all channels end at approximately the same distance



Distribution and abundance of LWD, distribution of substrates, and distribution of Rosgen channel entrenchment in Tributary 1 of Crane Creek, summer 2002. LWD, and substrate, were recorded for each habitat unit in the stream. Entrenchment measurements were recorded only where calibration measurements (paired samples) were made. X-axis indicates distance upstream from confluence with Crane Creek.

LWD figure: Vertical bars represent total count of LWD (all sizes). Open circles represent the amount of the total LWD that was >5 m in length, >55 cm in diameter (size 4 only).

Substrate figure: Closed circles are dominant substrates, open circles are subdominant substrates. See Appendix A for substrate sizes.

Entrenchment figure: Vertical bars represent entrenchment ratio. Dotted reference lines delineate entrenched (1-1.4), moderately entrenched (1.41-2.2), and slightly entrenched (>2.2) channels. Entrenchment was calculated as floodprone width divided by bankfull width (see Rosgen 1996).

Stream:	Tributary 1a of Crane Creek
District:	Andrew Pickens
USGS Quadrangle:	Tamassee
Survey Date:	08/07/02
Downstream Starting Point:	Confluence with tributary 1 – tributary 1a appears as the continuation of tributary 1 on the USGS quadrangle map. The upper portion of the channel surveyed as tributary 1 does not appear on the quad map but does appear on the map presented in this report.
Total Distance Surveyed (km):	1.2

	Pools	Riffles
Percent of Total Stream Area:	17	83
Total Area (m ²):	56±--	270±--
Correction Factor Applied:	0.90	0.92
Number of Paired Samples:	1	1
Total Count:	2	2
Number per km:	2	2
Mean Area (m ²):	28	135
Mean Maximum Depth (cm):	5	4
Mean Average Depth (cm):	2	2
Mean Residual Depth (cm):	--	--
Percent Surveyed as Glides:	100	--
Percent Surveyed as Runs:	--	0
Percent Surveyed as Cascades:	--	0
Percent with Substrate > 35% Embedded:	0	--

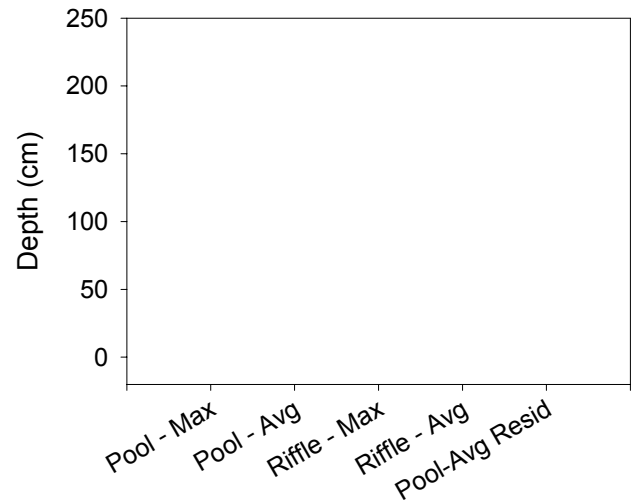
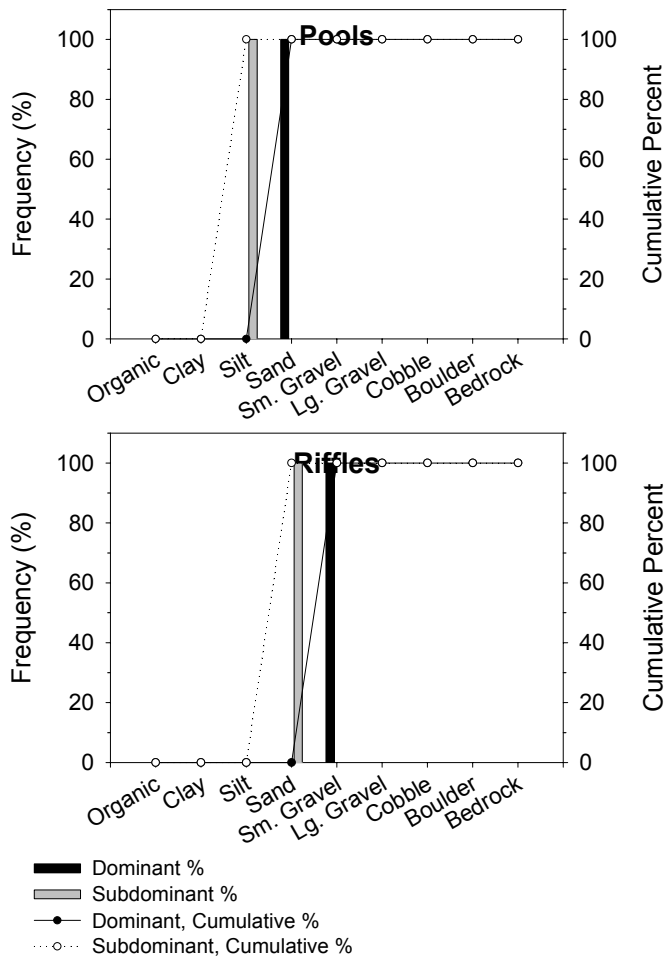
Large Woody Debris Size	Pieces per km
< 5 m long, 10 cm – 55 cm diameter:	14
< 5 m long, > 55 cm diameter:	0
> 5 m long, 10 cm – 55 cm diameter:	6
> 5 m long, > 55 cm diameter:	0
Total:	19

	Riparian Width* (m)	Bankfull Width (m)	Flood Prone Width** (m)	Entrenchment Ratio***	Gradient (%)	Water Temperature (C)
Mean	1	3	5	1.47	4	17
Maximum	1	3	5	1.47	4	17
75 th Percentile	1	3	5	1.47	4	17
Median	1	3	5	1.47	4	17
25 th Percentile	1	3	5	1.47	4	17
Minimum	1	3	5	1.47	4	17
Sample Size	2	1	1	1	1	1

* grouped left and right riparian width together for calculations

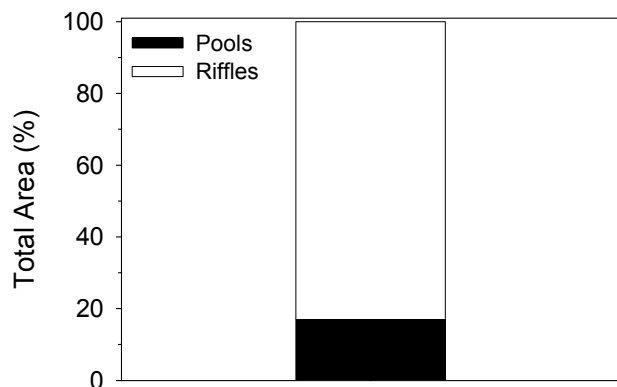
** left riparian, right riparian, and bankfull channel widths were added together for calculations

*** calculated as floodprone width divided by bankfull width

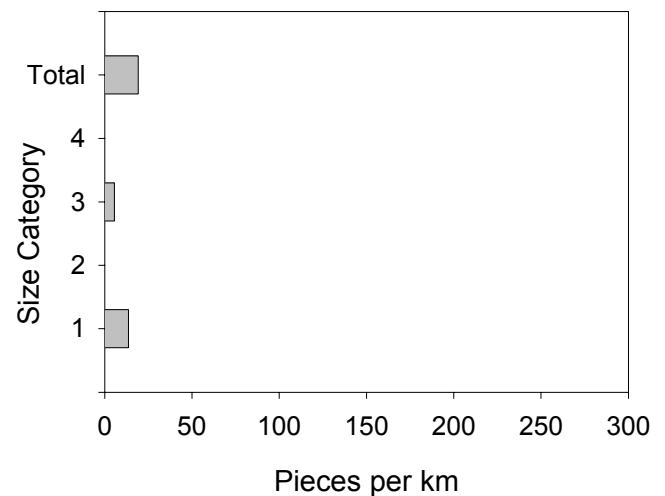


Maximum and average depths and residual pool depths for pools and riffles in Tributary 1a of Crane Creek, summer 2002. The top and bottom of the boxes represent the 25th and 75th percentiles, the bar in the center of the box represents the median, whiskers represent the 10th and 90th percentiles, and closed circles represent the entire range of the data. Figure not available; small sample size.

Frequency (percent) and cumulative percent of dominant and subdominant substrate occurrence for pools and riffles in Tributary 1a of Crane Creek, summer 2002.



Estimated area of Tributary 1a of Crane Creek in pools and riffles as calculated using BVET techniques, summer 2002.

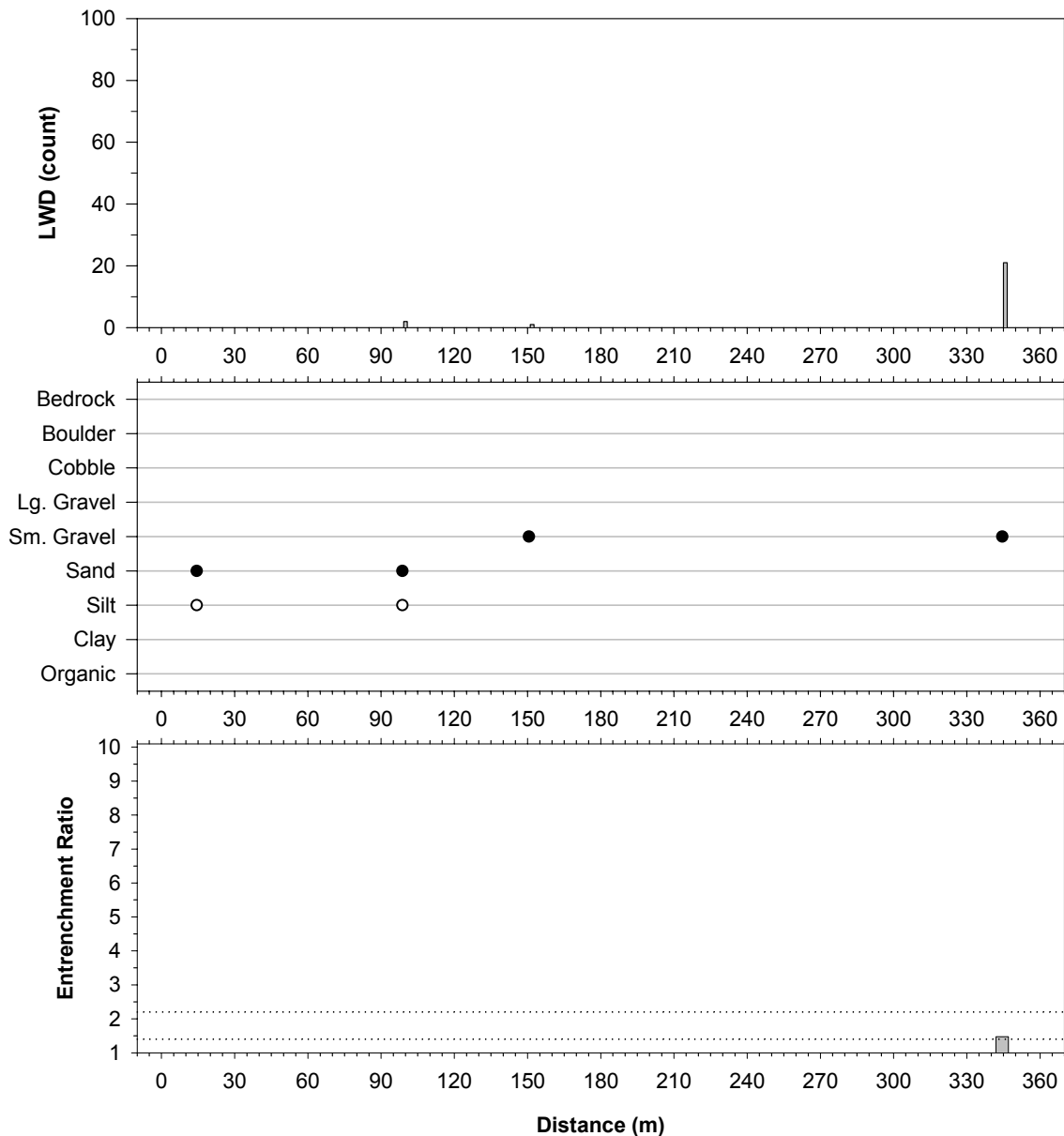


LWD per kilometer in Tributary 1a of Crane Creek, summer 2002. Y-axis labels are LWD size classes described below.

- Size 1: < 5 m long, 10-55 cm diameter
- Size 2: < 5 m long, > 55 cm diameter
- Size 3: > 5 m long, 10-55 cm diameter
- Size 4: > 5 m long, > 55 cm diameter

Stream features found on Tributary 1a of Crane Creek during BVET habitat survey, summer 2002. Distance is meters from start of survey.

Stream Feature	Distance (m)	Width (m)	Comments
Tributary	344.1	1.5	ends approximately 10 m upstream; goes underground
Tributary	639.3		dry

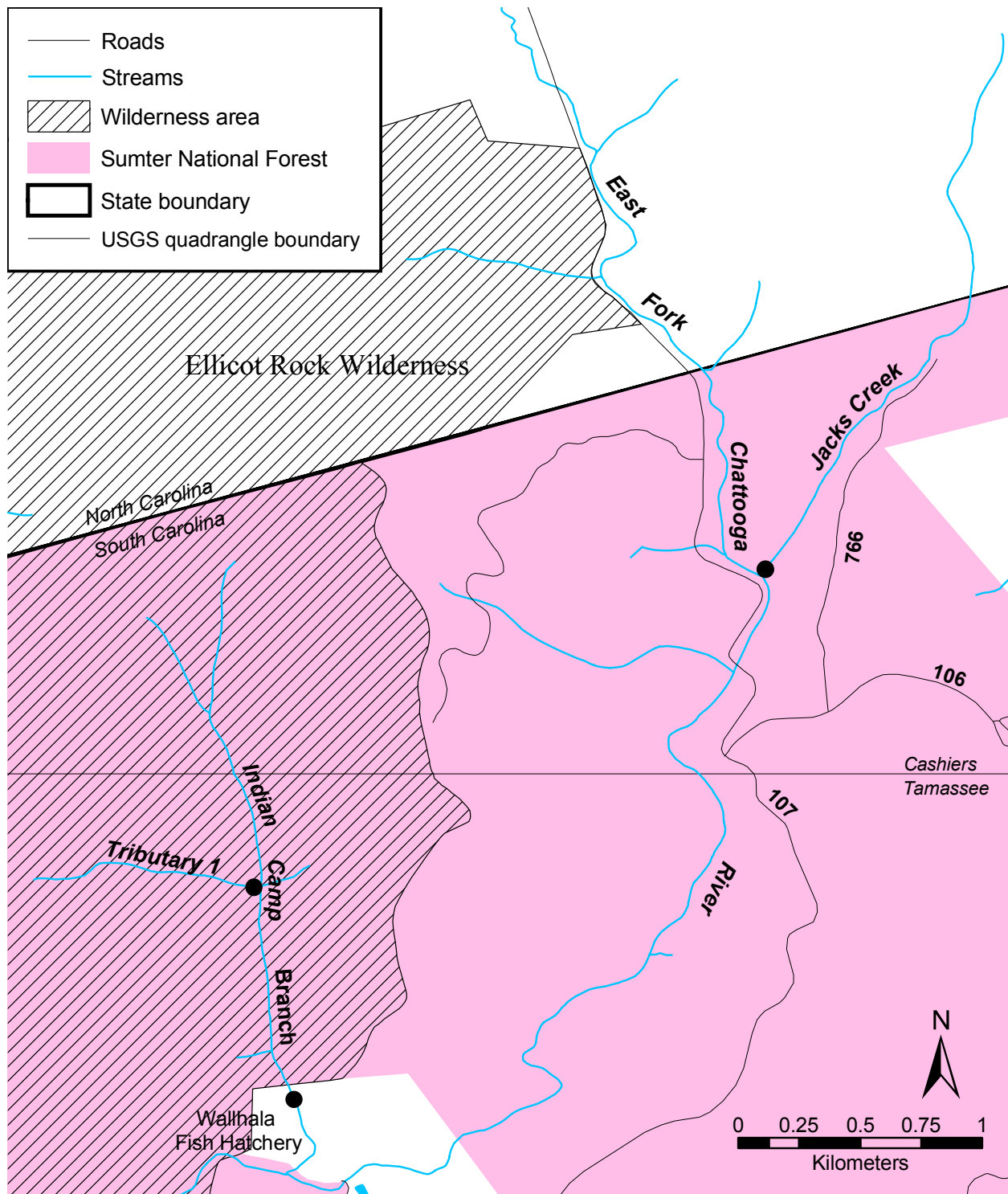


Distribution and abundance of LWD, distribution of substrates, and distribution of Rosgen channel entrenchment in Tributary 1a of Crane Creek, summer 2002. LWD, and substrate, were recorded for each habitat unit in the stream. Entrenchment measurements were recorded only where calibration measurements (paired samples) were made. X-axis indicates distance upstream from fork of Tributary 1 proceeding up the right channel.

LWD figure: Vertical bars represent total count of LWD (all sizes). Open circles represent the amount of the total LWD that was >5 m in length, >55 cm in diameter (size 4 only).

Substrate figure: Closed circles are dominant substrates, open circles are subdominant substrates. See Appendix A for substrate sizes.

Entrenchment figure: Vertical bars represent entrenchment ratio. Dotted reference lines delineate entrenched (1-1.4), moderately entrenched (1.41-2.2), and slightly entrenched (>2.2) channels. Entrenchment was calculated as floodprone width divided by bankfull width (see Rosgen 1996).



Location of habitat survey start points (closed circles) for Indian Camp Branch, Indian Camp Branch Tributary 1, and Jacks Creek, summer 2002.

Stream:	Indian Camp Branch
District:	Andrew Pickens
USGS Quadrangle:	Tamassee & Cashiers
Survey Date:	07/19/02
Downstream Starting Point:	upstream of dam diverting water to hatchery, same start point as snorkel survey done on 03/13/02 (Moran et al. 2002)
Total Distance Surveyed (km):	2.7

	Pools	Riffles
Percent of Total Stream Area:	29	71
Total Area (m ²):	2466±177	6029±472
Correction Factor Applied:	1.14	1.16
Number of Paired Samples:	9	9
Total Count:	92	87
Number per km:	34	32
Mean Area (m ²):	27	69
Mean Maximum Depth (cm):	29	13
Mean Average Depth (cm):	17	7
Mean Residual Depth (cm):	9	--
Percent Surveyed as Glides:	13	--
Percent Surveyed as Runs:	--	2
Percent Surveyed as Cascades:	--	0
Percent with Substrate > 35% Embedded:	57	--

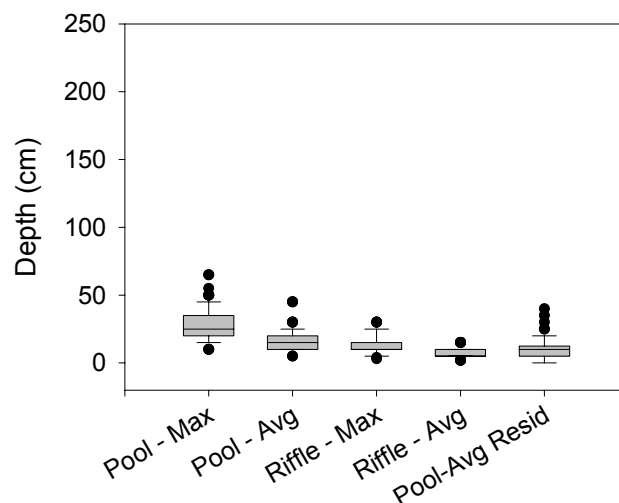
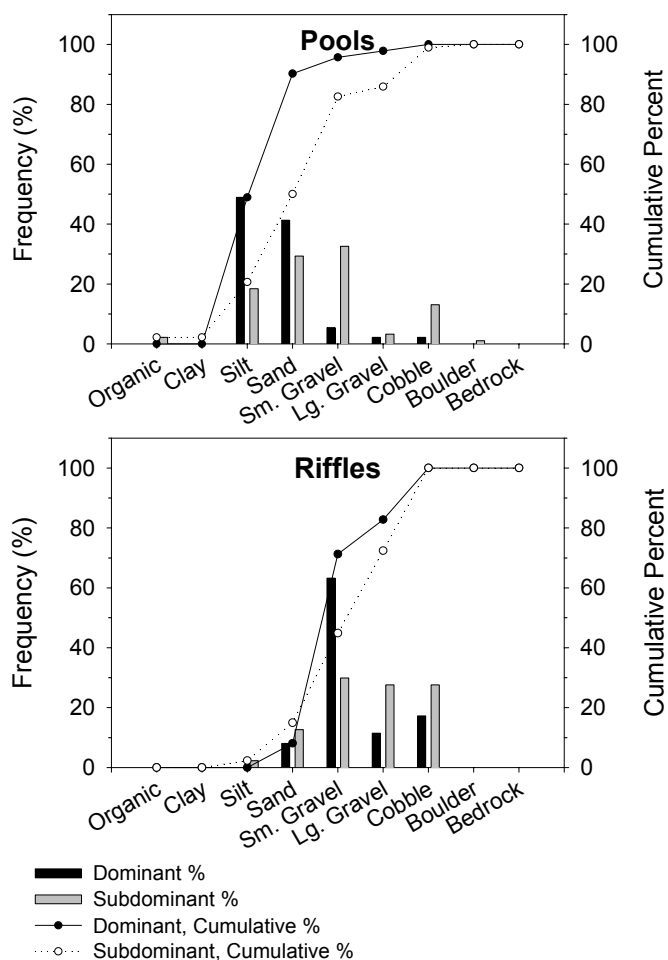
Large Woody Debris Size	Pieces per km
< 5 m long, 10 cm – 55 cm diameter:	129
< 5 m long, > 55 cm diameter:	3
> 5 m long, 10 cm – 55 cm diameter:	87
> 5 m long, > 55 cm diameter:	8
Total:	227

	Riparian Width* (m)	Bankfull Width (m)	Flood Prone Width** (m)	Entrenchment Ratio***	Gradient (%)	Water Temperature (C)
Mean	4	5	13	2.66	4	16
Maximum	10	8	19	5.33	6	17
75 th Percentile	6	6	16	2.97	4	16
Median	4	5	14	2.41	3	16
25 th Percentile	1	5	11	1.82	3	16
Minumum	0	2	4	1.57	3	15
Sample Size	18	9	9	9	9	5

* grouped left and right riparian width together for calculations

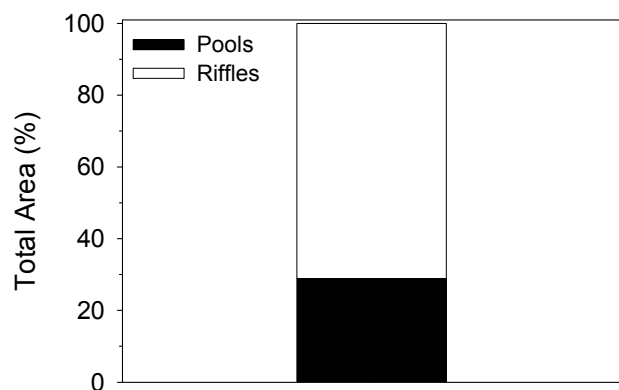
** left riparian, right riparian, and bankfull channel widths were added together for calculations

*** calculated as floodprone width divided by bankfull width

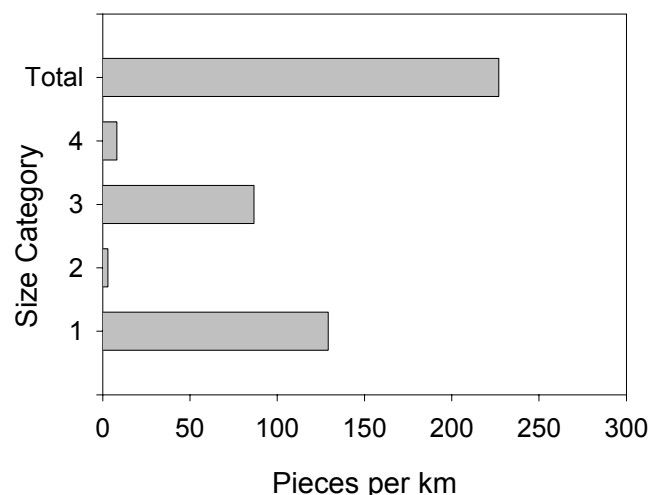


Maximum and average depths and residual pool depths for pools and riffles in Indian Camp Branch, summer 2002. The top and bottom of the boxes represent the 25th and 75th percentiles, the bar in the center of the box represents the median, whiskers represent the 10th and 90th percentiles, and closed circles represent the entire range of the data.

Frequency (percent) and cumulative percent of dominant and subdominant substrate occurrence for pools and riffles in Indian Camp Branch, summer 2002.



Estimated area of Indian Camp Branch in pools and riffles as calculated using BVET techniques, summer 2002.

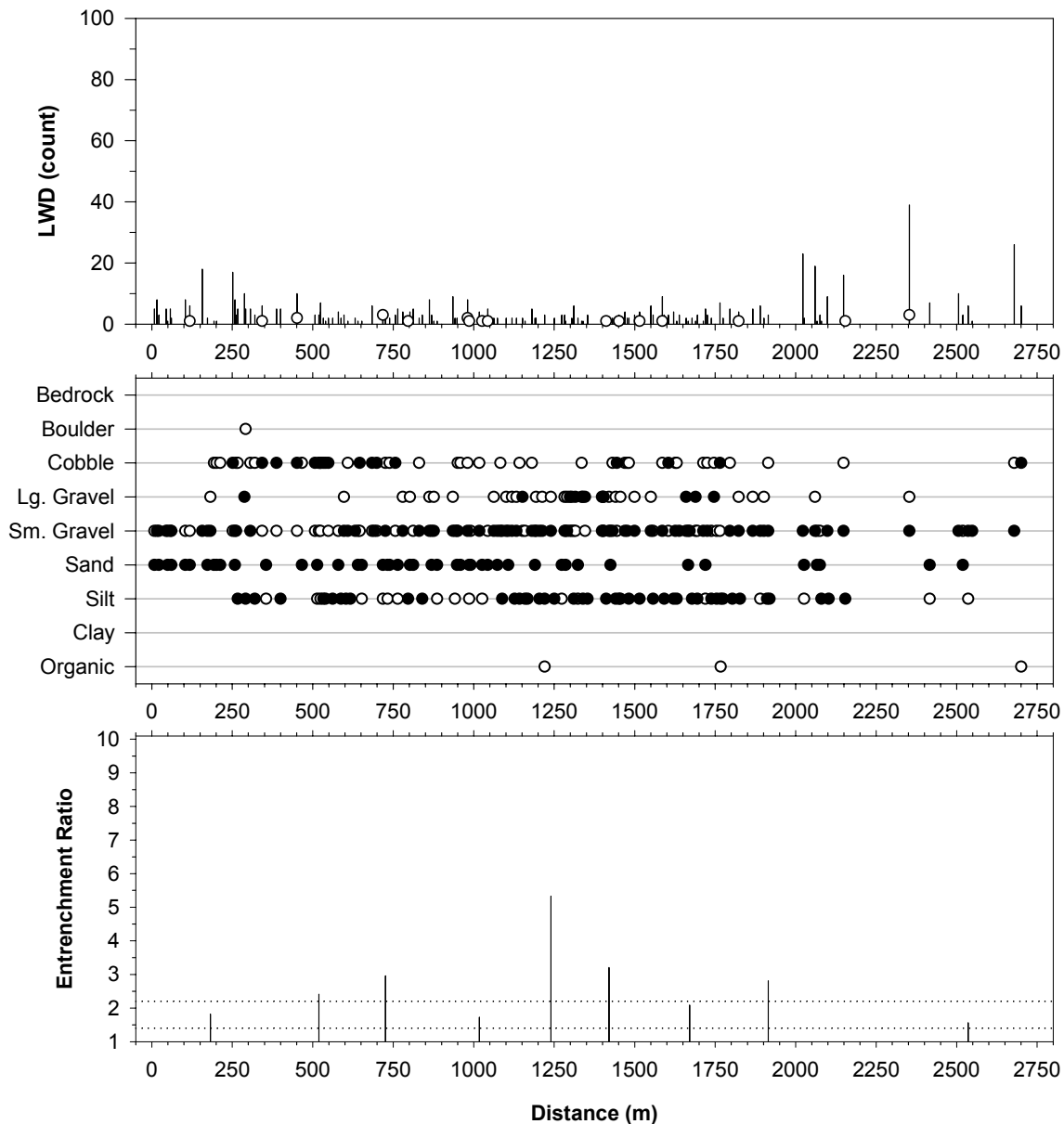


LWD per kilometer in Indian Camp Branch, summer 2002. Y-axis labels are LWD size classes described below.

- Size 1: < 5 m long, 10-55 cm diameter
- Size 2: < 5 m long, > 55 cm diameter
- Size 3: > 5 m long, 10-55 cm diameter
- Size 4: > 5 m long, > 55 cm diameter

Stream features found on Indian Camp Branch during BVET habitat survey, summer 2002. Distance is meters from start of survey.

Stream Feature	Distance (m)	Width (m)	Comments
Tributary	228.3	0.5	on left
Tributary	371.0	1.5	on left
Tributary	561.6	1.0	on left
Side Channel In	653.8	0.5	on right
Side Channel In	689.8	1.0	on left
Side Channel Out	700.5	1.5	on left
Side Channel Out	701.5	1.0	on right
Seep	738.4		on left
Tributary	770.7	1.0	on left
Tributary	820.6		on right - dry
Tributary	992.4	2.0	on left
Tributary	999.2	1.0	on right
Tributary	1080.6	1.0	on right
Side Channel In	1296.0	0.5	on right
Side Channel Out	1305.1		on right - dry
Tributary	1313.3	1.0	on right - ending underground after 15 meters
Side Channel In	1351.0	1.5	on left
Tributary	1379.9		on right - ending at a dry underground spring
Side Channel Out	1389.3		on left - underground
Tributary	1506.3	1.0	on right
Tributary	1542.8	1.5	on right
Side Channel In	1806.2	1.2	on left
Tributary	1822.8	0.8	on right - ending at spring after 25 to 35 meters
Tributary	1829.2	0.5	on right - ending at spring after approximately 50 meters
Side Channel Out	1830.7	1.5	on left
Tributary	1917.0	1.0	on right
Side Channel In	1990.1		on right - underground
Side Channel Out	1999.9		on right
Side Channel In	115.8	1.0	on right
Side Channel Out	131.7		on right - underground
Tributary	132.2	1.5	on right
Tributary	327.3	1.0	on left
Underground	24.0		
Tributary	71.0		on left - underground
Underground	71.0		
Underground	159.6		
Trail	169.4		stream flows underground just long enough for the trail from Sloan Bridge Picnic area to cross the stream
Underground	189.5		
Underground	208.0		
Side Channel	256.6	1.0	on right
Side Channel	269.5		on right - underground
Underground	330.6		
Tributary	333.5	0.5	on right - ending underground into the mountain
Underground/Riffle	350.8	0.2	The stream alternates between riffle and underground, before it ends by entering the mountainside.



Distribution and abundance of LWD, distribution of substrates, and distribution of Rosgen channel entrenchment in Indian Camp Branch, summer 2002. LWD, and substrate, were recorded for each habitat unit in the stream. Entrenchment measurements were recorded only where calibration measurements (paired samples) were made. X-axis indicates distance upstream from upstream of dam diverting water to hatchery.

LWD figure: Vertical bars represent total count of LWD (all sizes). Open circles represent the amount of the total LWD that was >5 m in length, >55 cm in diameter (size 4 only).

Substrate figure: Closed circles are dominant substrates, open circles are subdominant substrates. See Appendix A for substrate sizes.

Entrenchment figure: Vertical bars represent entrenchment ratio. Dotted reference lines delineate entrenched (1-1.4), moderately entrenched (1.41-2.2), and slightly entrenched (>2.2) channels. Entrenchment was calculated as floodprone width divided by bankfull width (see Rosgen 1996).

Stream:	Tributary 1 of Indian Camp Branch
District:	Andrew Pickens
USGS Quadrangle:	Tamassee & Cashiers
Survey Date:	08/01/02
Downstream Starting Point:	Confluence with Indian Camp Branch – only tributary shown on 1:24,000 USGS quadrangle map; on left
Total Distance Surveyed (km):	1.1

	Pools	Riffles
Percent of Total Stream Area:	7	93
Total Area (m ²):	139±0	1795±343
Correction Factor Applied:	1.25	0.92
Number of Paired Samples:	2	3
Total Count:	15	29
Number per km:	14	27
Mean Area (m ²):	9	62
Mean Maximum Depth (cm):	13	9
Mean Average Depth (cm):	7	4
Mean Residual Depth (cm):	1	--
Percent Surveyed as Glides:	33	--
Percent Surveyed as Runs:	--	0
Percent Surveyed as Cascades:	--	10
Percent with Substrate > 35% Embedded:	73	--

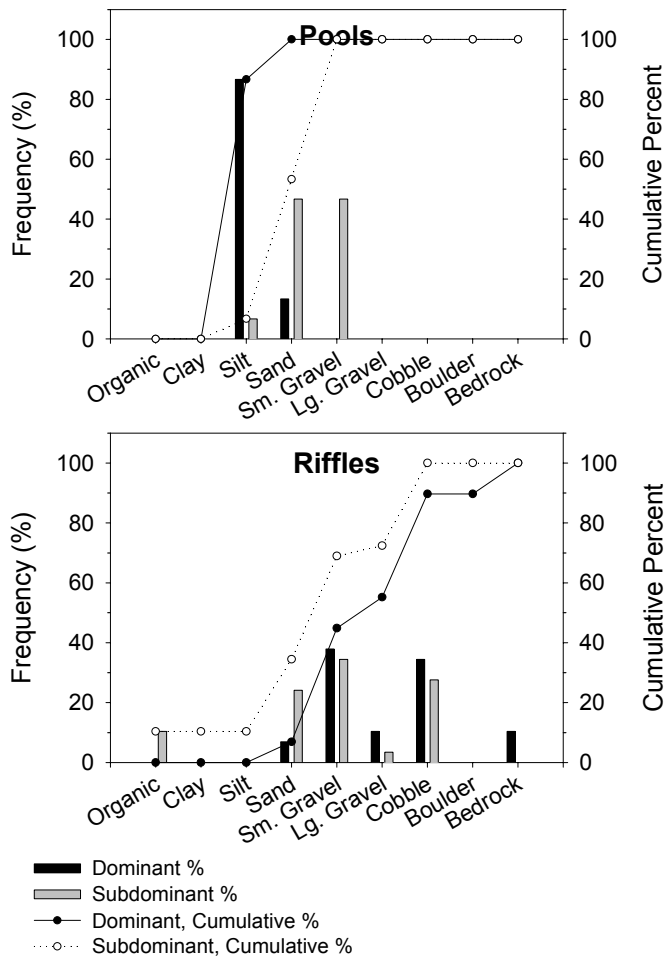
Large Woody Debris Size	Pieces per km
< 5 m long, 10 cm – 55 cm diameter:	104
< 5 m long, > 55 cm diameter:	1
> 5 m long, 10 cm – 55 cm diameter:	47
> 5 m long, > 55 cm diameter:	5
Total:	156

	Riparian Width* (m)	Bankfull Width (m)	Flood Prone Width** (m)	Entrenchment Ratio***	Gradient (%)	Water Temperature (C)
Mean	4	3	12	4.33	11	15
Maximum	14	3	22	8.04	28	16
75 th Percentile	4	3	14	5.32	13	16
Median	3	3	7	2.60	7	15
25 th Percentile	2	3	7	2.47	5	15
Minumum	1	3	7	2.34	4	14
Sample Size	6	3	3	3	4	2

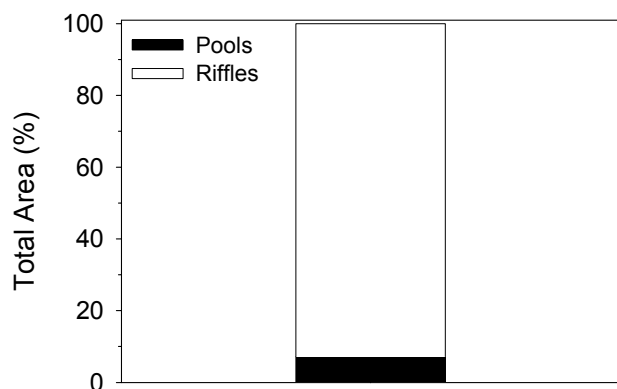
* grouped left and right riparian width together for calculations

** left riparian, right riparian, and bankfull channel widths were added together for calculations

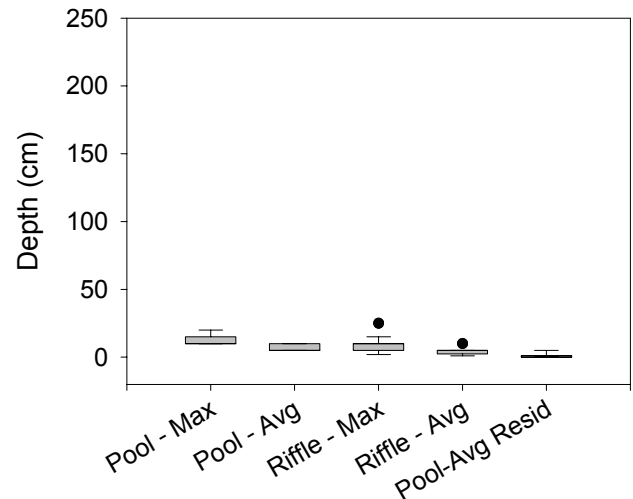
*** calculated as floodprone width divided by bankfull width



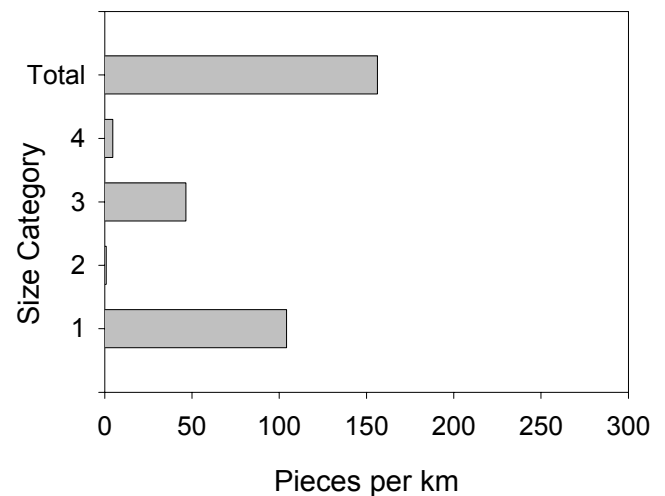
Frequency (percent) and cumulative percent of dominant and subdominant substrate occurrence for pools and riffles in Tributary 1 of Indian Camp Branch, summer 2002.



Estimated area of Tributary 1 of Indian Camp Branch in pools and riffles as calculated using BVET techniques, summer 2002.



Maximum and average depths and residual pool depths for pools and riffles in Tributary 1 of Indian Camp Branch, summer 2002. The top and bottom of the boxes represent the 25th and 75th percentiles, the bar in the center of the box represents the median, whiskers represent the 10th and 90th percentiles, and closed circles represent the entire range of the data.

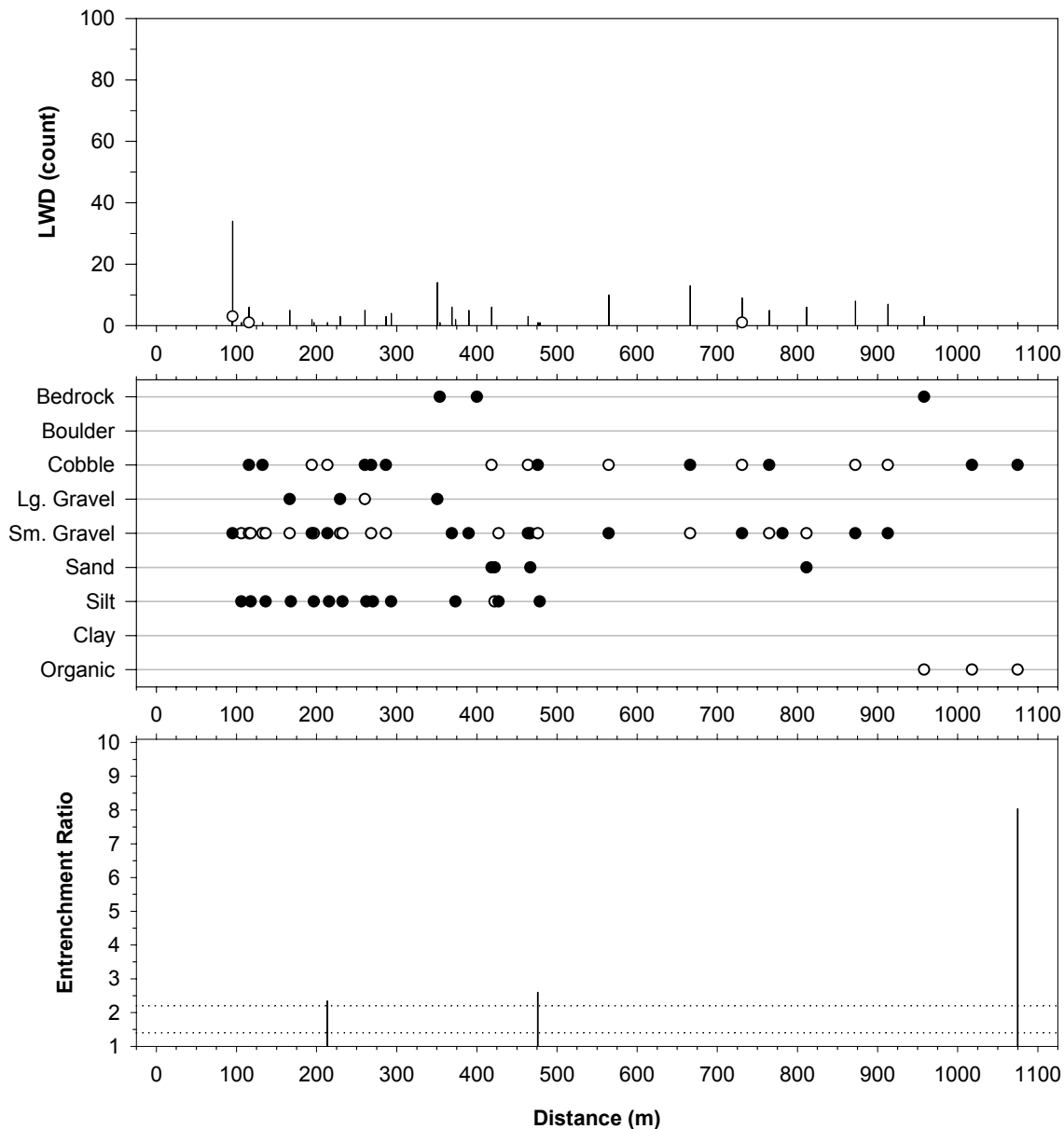


LWD per kilometer in Tributary 1 of Indian Camp Branch, summer 2002. Y-axis labels are LWD size classes described below.

- Size 1: < 5 m long, 10-55 cm diameter
- Size 2: < 5 m long, > 55 cm diameter
- Size 3: > 5 m long, 10-55 cm diameter
- Size 4: > 5 m long, > 55 cm diameter

Stream features found on Tributary 1 of Indian Camp Branch during BVET habitat survey, summer 2002.
Distance is meters from start of survey.

Stream Feature	Distance (m)	Width (m)	Comments
Side Channel In	108.9	1.5	on left
Side Channel Out	119.0		on left - underground
Tributary	179.6	3.0	on right
Tributary	199.9	1.5	on right
Tributary	251.6		on right
Seep	267.9		on right
Tributary	401.3	1.5	on left
Tributary	422.0	1.5	on left
Side Channel In	547.7	0.5	on left
Side Channel Out	557.7		on left - underground
Side Channel In	610.7	1.0	on right
Side Channel Out	638.1		on right - underground
Tributary	659.6		on right - underground
Tributary	683.2	0.8	on left
Tributary	730.8		on right - underground
Tributary	927.3		on left - underground

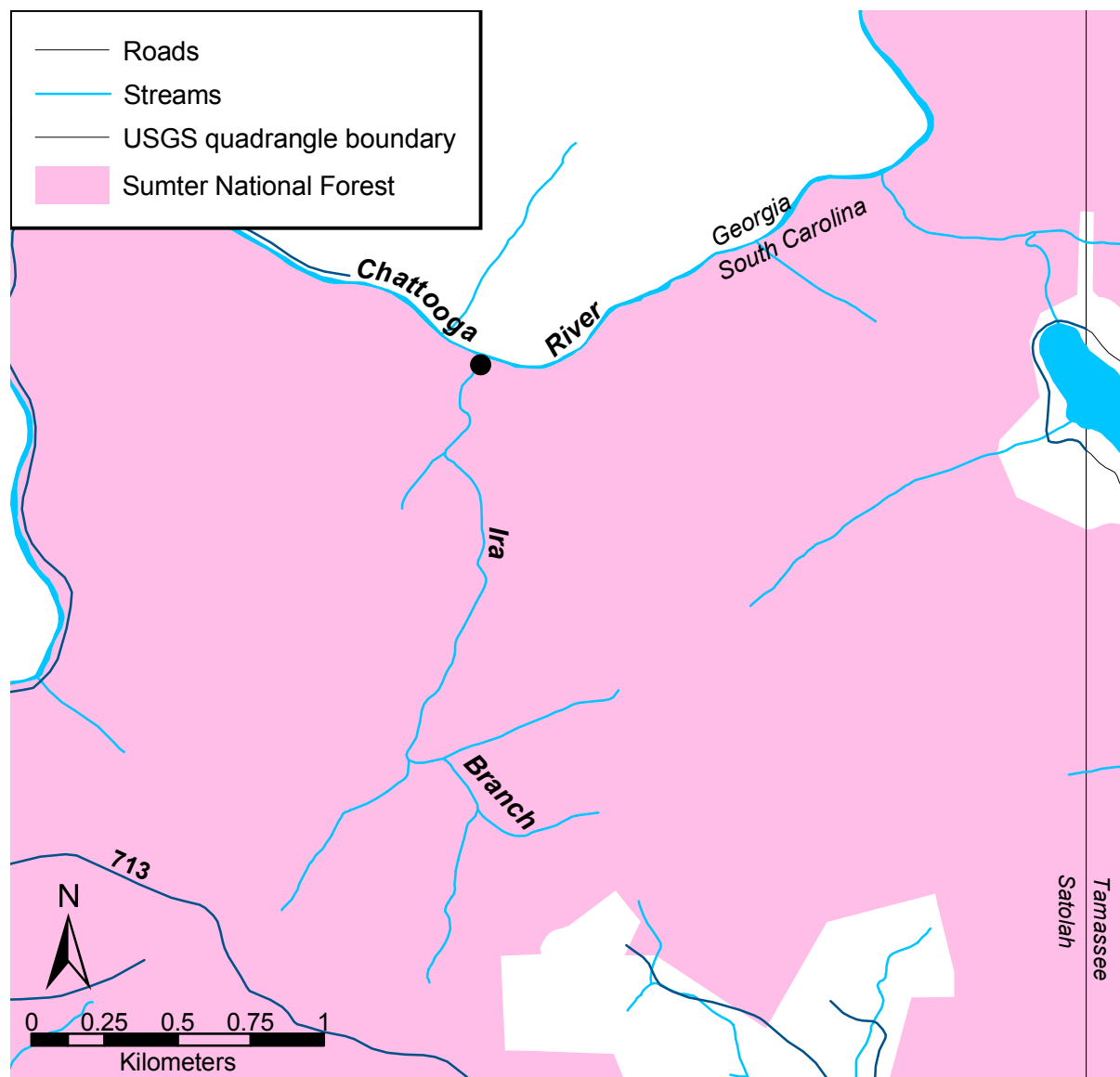


Distribution and abundance of LWD, distribution of substrates, and distribution of Rosgen channel entrenchment in Tributary 1 of Indian Camp Branch, summer 2002. LWD, and substrate, were recorded for each habitat unit in the stream. Entrenchment measurements were recorded only where calibration measurements (paired samples) were made. X-axis indicates distance upstream from confluence with Indian Camp Branch.

LWD figure: Vertical bars represent total count of LWD (all sizes). Open circles represent the amount of the total LWD that was >5 m in length, >55 cm in diameter (size 4 only).

Substrate figure: Closed circles are dominant substrates, open circles are subdominant substrates. See Appendix A for substrate sizes.

Entrenchment figure: Vertical bars represent entrenchment ratio. Dotted reference lines delineate entrenched (1-1.4), moderately entrenched (1.41-2.2), and slightly entrenched (>2.2) channels. Entrenchment was calculated as floodprone width divided by bankfull width (see Rosgen 1996).



Location of habitat survey start point (closed circle) for Ira Branch, summer 2002.

Stream:	Ira Branch
District:	Andrew Pickens
USGS Quadrangle:	Satolah
Survey Date:	08/07/02
Downstream Starting Point:	Confluence with Chattooga River
Total Distance Surveyed (km):	3.2

	Pools	Riffles
Percent of Total Stream Area:	21	79
Total Area (m ²):	972±82	3663±388
Correction Factor Applied:	0.95	0.94
Number of Paired Samples:	9	8
Total Count:	88	76
Number per km:	28	24
Mean Area (m ²):	11	48
Mean Maximum Depth (cm):	19	11
Mean Average Depth (cm):	11	5
Mean Residual Depth (cm):	5	--
Percent Surveyed as Glides:	51	--
Percent Surveyed as Runs:	--	5
Percent Surveyed as Cascades:	--	5
Percent with Substrate > 35% Embedded:	24	--

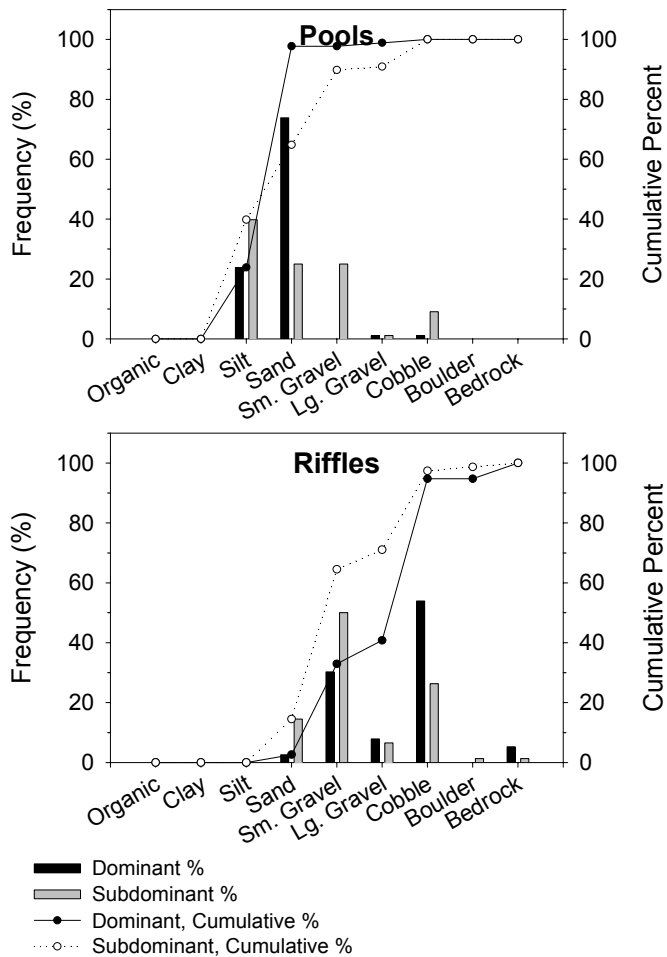
Large Woody Debris Size	Pieces per km
< 5 m long, 10 cm – 55 cm diameter:	61
< 5 m long, > 55 cm diameter:	0
> 5 m long, 10 cm – 55 cm diameter:	31
> 5 m long, > 55 cm diameter:	1
Total:	92

	Riparian Width* (m)	Bankfull Width (m)	Flood Prone Width** (m)	Entrenchment Ratio***	Gradient (%)	Water Temperature (C)
Mean	4	3	12	3.52	16	18
Maximum	28	5	34	8.00	80	19
75 th Percentile	3	4	12	4.30	18	18
Median	2	3	9	2.91	5	18
25 th Percentile	1	2	8	1.72	4	17
Minumum	0	2	3	1.43	3	16
Sample Size	16	8	8	8	11	4

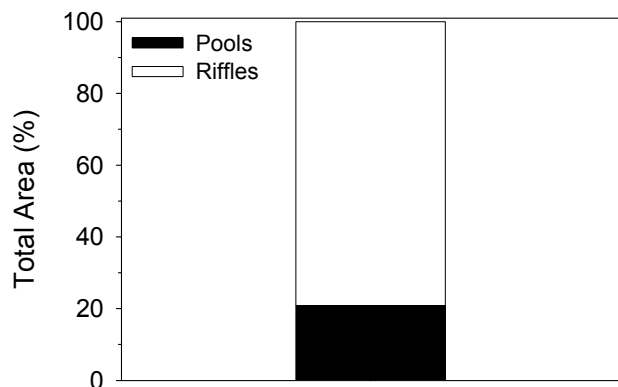
* grouped left and right riparian width together for calculations

** left riparian, right riparian, and bankfull channel widths were added together for calculations

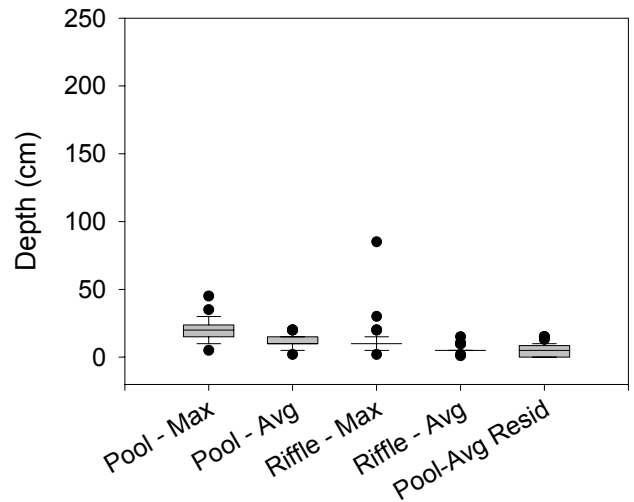
*** calculated as floodprone width divided by bankfull width



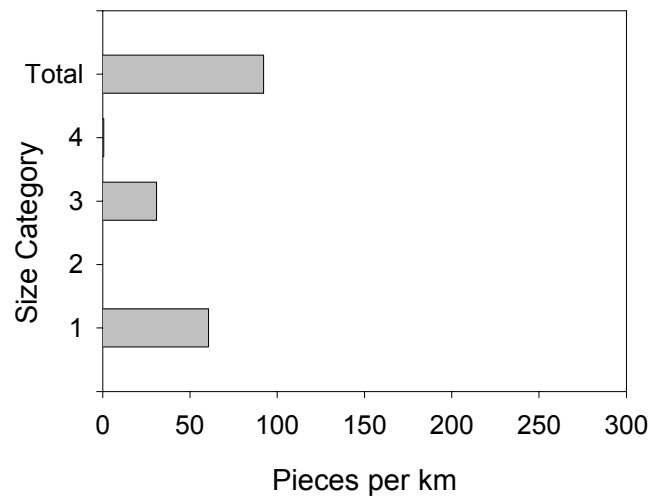
Frequency (percent) and cumulative percent of dominant and subdominant substrate occurrence for pools and riffles in Ira Branch, summer 2002.



Estimated area of Ira Branch in pools and riffles as calculated using BVET techniques, summer 2002.



Maximum and average depths and residual pool depths for pools and riffles in Ira Branch, summer 2002. The top and bottom of the boxes represent the 25th and 75th percentiles, the bar in the center of the box represents the median, whiskers represent the 10th and 90th percentiles, and closed circles represent the entire range of the data.

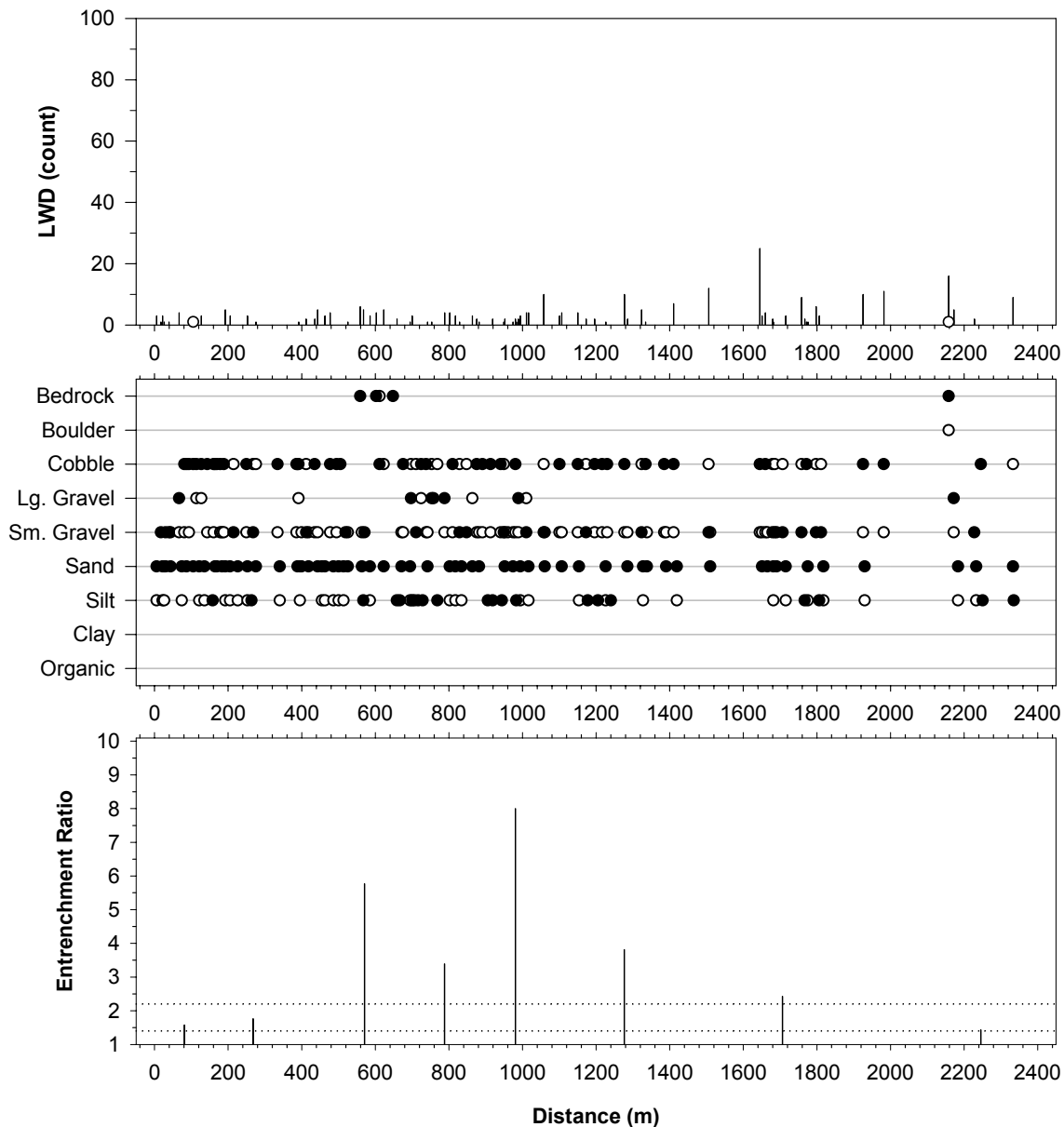


LWD per kilometer in Ira Branch, summer 2002. Y-axis labels are LWD size classes described below.

- Size 1: < 5 m long, 10-55 cm diameter
- Size 2: < 5 m long, > 55 cm diameter
- Size 3: > 5 m long, 10-55 cm diameter
- Size 4: > 5 m long, > 55 cm diameter

Stream features found on Ira Branch during BVET habitat survey, summer 2002. Distance is meters from start of survey.

Stream Feature	Distance (m)	Width (m)	Comments
Bridge	54.9		foot trail bridge
Tributary	477.0	1.0	on right
Tributary	671.0	1.5	on left
Tributary	723.2	0.2	on left possible side channel
Tributary	730.0	0.2	on left possible side channel out, yet the water level is too low and the water is flowing into main channel.
Side Channel In	821.5	1.0	on right
Side Channel	829.3	1.0	
Side Channel In	895.1		on right - dry; appears to be an overflow area/ rain drainage.
Tributary	944.0	0.3	on left - muddy with not a lot of water flow.
Side Channel In	1167.6	1.0	on left
Tributary	1257.1		on left - dry
Tributary	1527.3		on left - dry
Tributary	1848.8	1.0	on right
Tributary	1871.3	1.0	on right
Trail	1878.0		foot trail; not used regularly
Tributary	1944.5	1.0	on left - no fish habitat
Tributary	2221.9		on left - dry
Tributary	2250.5	0.3	on right - no fish habitat
Tributary	2285.1	0.3	on right - possibly labeled T3 on topo map.
Tributary	2409.0	0.3	on right

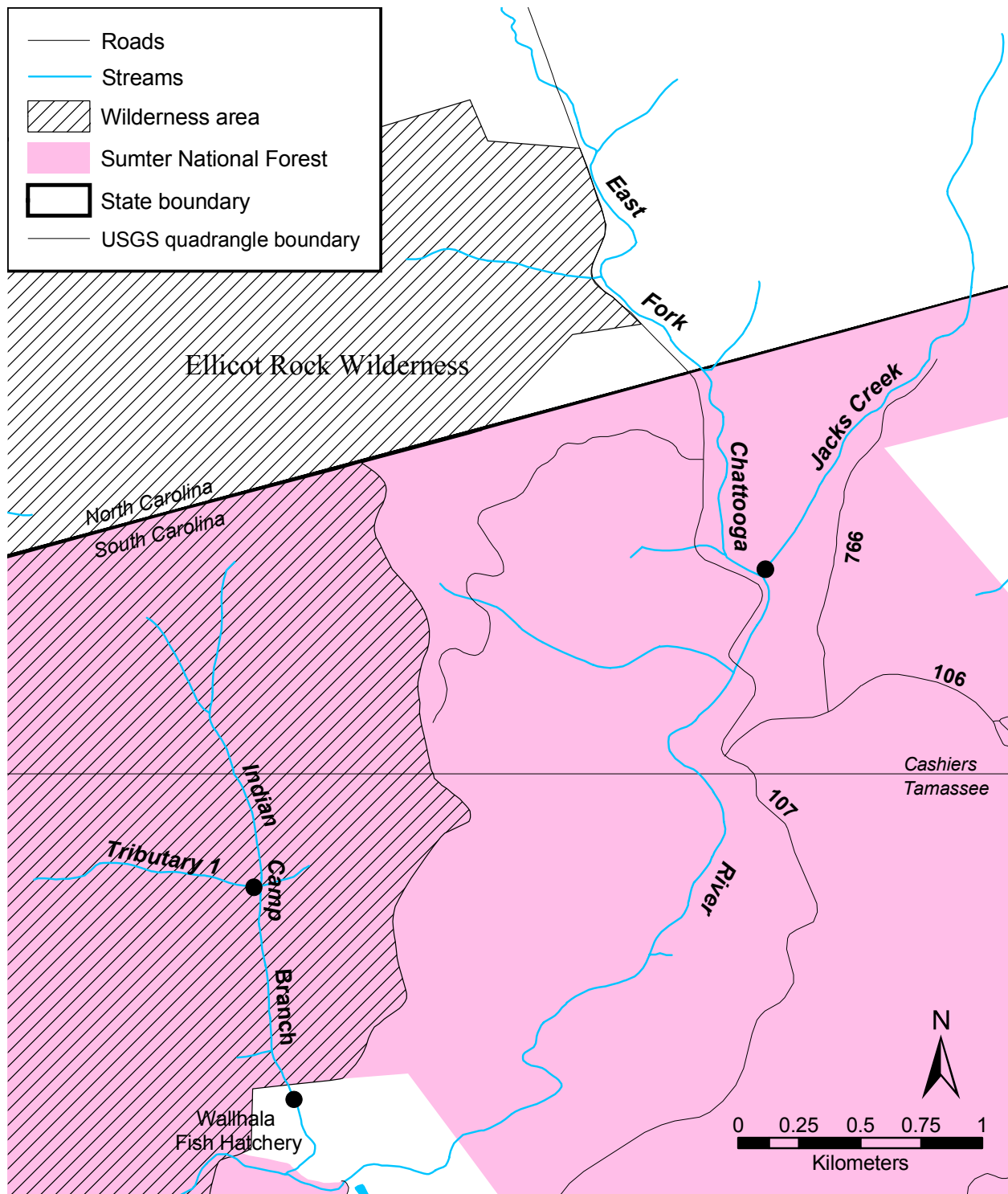


Distribution and abundance of LWD, distribution of substrates, and distribution of Rosgen channel entrenchment in Ira Branch, summer 2002. LWD, and substrate, were recorded for each habitat unit in the stream. Entrenchment measurements were recorded only where calibration measurements (paired samples) were made. X-axis indicates distance upstream from confluence with Chattooga River.

LWD figure: Vertical bars represent total count of LWD (all sizes). Open circles represent the amount of the total LWD that was >5 m in length, >55 cm in diameter (size 4 only).

Substrate figure: Closed circles are dominant substrates, open circles are subdominant substrates. See Appendix A for substrate sizes.

Entrenchment figure: Vertical bars represent entrenchment ratio. Dotted reference lines delineate entrenched (1-1.4), moderately entrenched (1.41-2.2), and slightly entrenched (>2.2) channels. Entrenchment was calculated as floodprone width divided by bankfull width (see Rosgen 1996).



Location of habitat survey start points (closed circles) for Jacks Creek, Indian Camp Branch, and Tributary 1 Indian Camp Branch, summer 2002.

Stream:	Jacks Creek
District:	Andrew Pickens
USGS Quadrangle:	Cashiers
Survey Date:	07/16/02
Downstream Starting Point:	Confluence with East Fork of the Chattooga River
Total Distance Surveyed (km):	2.9

	Pools	Riffles
Percent of Total Stream Area:	29	71
Total Area (m ²):	2125±151	5171±522
Correction Factor Applied:	1.04	1.15
Number of Paired Samples:	9	9
Total Count:	94	96
Number per km:	32	33
Mean Area (m ²):	23	54
Mean Maximum Depth (cm):	27	13
Mean Average Depth (cm):	16	7
Mean Residual Depth (cm):	11	--
Percent Surveyed as Glides:	24	--
Percent Surveyed as Runs:	--	5
Percent Surveyed as Cascades:	--	6
Percent with Substrate > 35% Embedded:	62	--

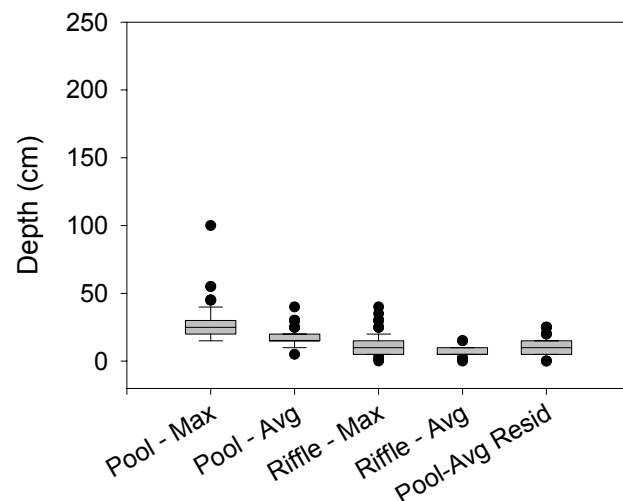
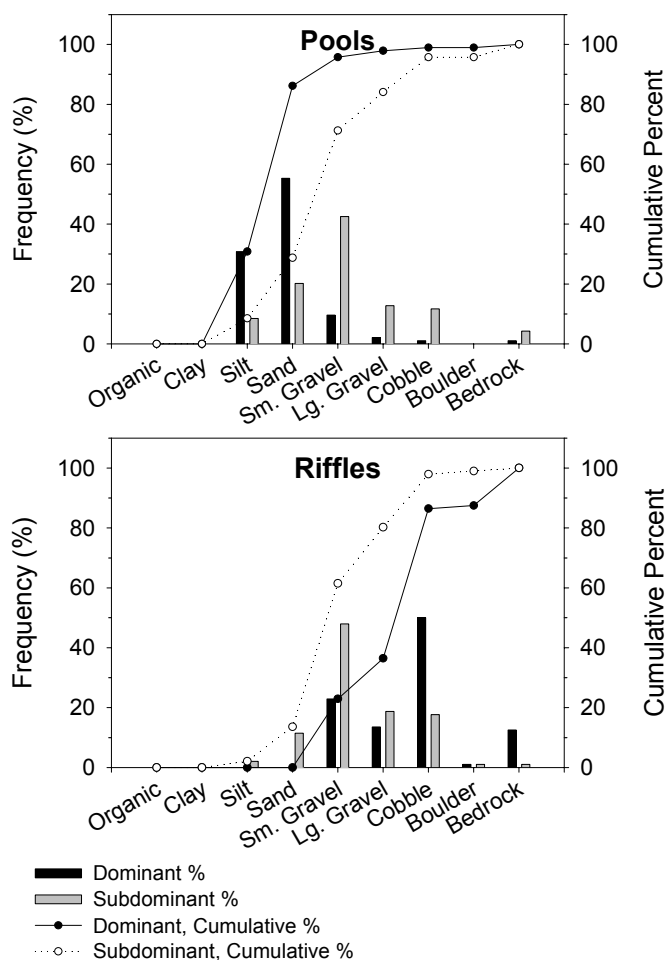
Large Woody Debris Size	Pieces per km
< 5 m long, 10 cm – 55 cm diameter:	96
< 5 m long, > 55 cm diameter:	3
> 5 m long, 10 cm – 55 cm diameter:	45
> 5 m long, > 55 cm diameter:	6
Total:	151

	Riparian Width* (m)	Bankfull Width (m)	Flood Prone Width** (m)	Entrenchment Ratio***	Gradient (%)	Water Temperature (C)
Mean	6	5	16	3.87	11	17
Maximum	19	7	35	7.40	25	18
75 th Percentile	8	5	18	5.17	18	18
Median	4	5	13	3.58	5	17
25 th Percentile	1	3	11	2.17	4	17
Minumum	1	2	9	1.59	3	16
Sample Size	18	9	9	9	14	3

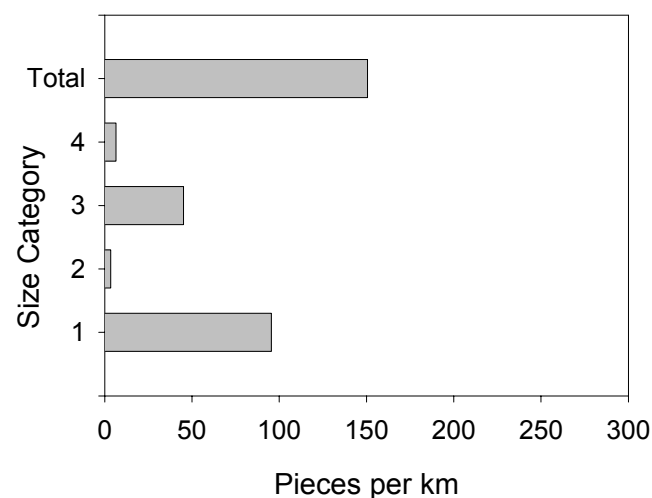
* grouped left and right riparian width together for calculations

** left riparian, right riparian, and bankfull channel widths were added together for calculations

*** calculated as floodprone width divided by bankfull width

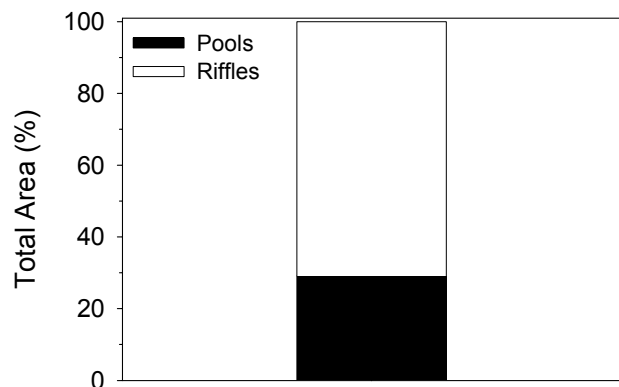


Maximum and average depths and residual pool depths for pools and riffles in Jacks Creek, summer 2002. The top and bottom of the boxes represent the 25th and 75th percentiles, the bar in the center of the box represents the median, whiskers represent the 10th and 90th percentiles, and closed circles represent the entire range of the data.



LWD per kilometer in Jacks Creek, summer 2002. Y-axis labels are LWD size classes described below.

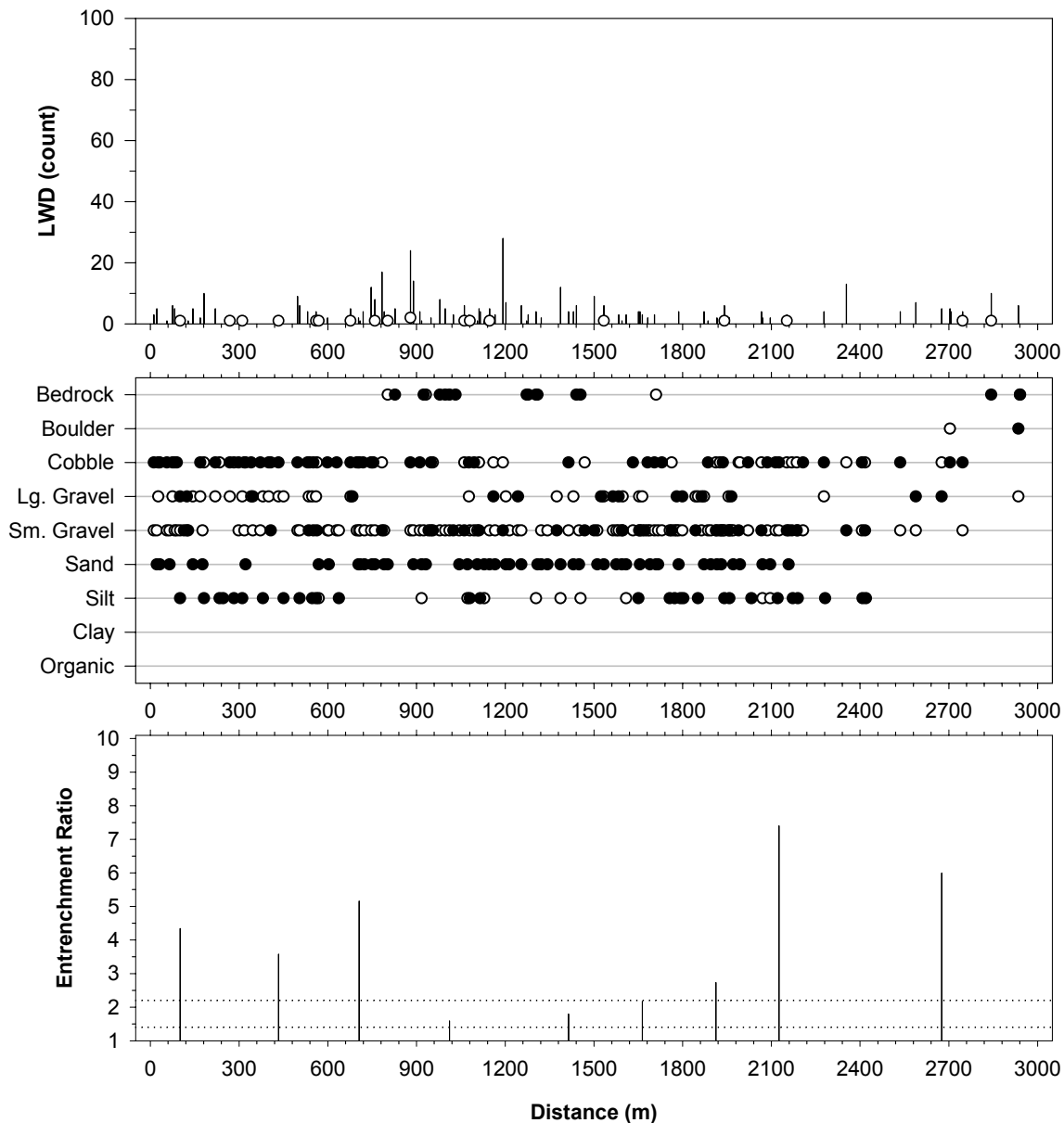
- Size 1: < 5 m long, 10-55 cm diameter
- Size 2: < 5 m long, > 55 cm diameter
- Size 3: > 5 m long, 10-55 cm diameter
- Size 4: > 5 m long, > 55 cm diameter



Estimated area of Jacks Creek in pools and riffles as calculated using BVET techniques, summer 2002.

Stream features found on Jacks Creek during BVET habitat survey, summer 2002. Distance is meters from start of survey.

Stream Feature	Distance (m)	Width (m)	Comments
Tributary	285.5	1	on right
Tributary	335.1	1	on left
Tributary	230.9	4	on right
Waterfall	300.4	8	height = 2.5m
Tributary	346.7	1	on left
Side Channel	606	3.5	
Tributary	620.7		on right; underground and intermittent
Tributary	732.7	1	on right; intermittent
Tributary	791.1		on left; underground, debris jam
Tributary	877.8	1	on left
Side Channel In	734.2	1	on left
Side Channel Out	755		on left - underground
Tributary	839.9	0.5	on right
Tributary	916.6	1	on right
Tributary	947.1	0.5	on right - not flowing
Tributary	956.5	0.5	on right
Tributary	987.0	1.5	on left
Seep	1042.0		on right
Tributary	1053.1	1	on left
Tributary	1257.0		on left - dry
Tributary	1280.4	1.5	even split; difficult to determine which is the main channel
Side Channel In	1544.0		on right; water seeps underground to create a side channel; out of view when in stream
Seep	1965.9		on right; very small
Tributary	1994.9		on right; trickle

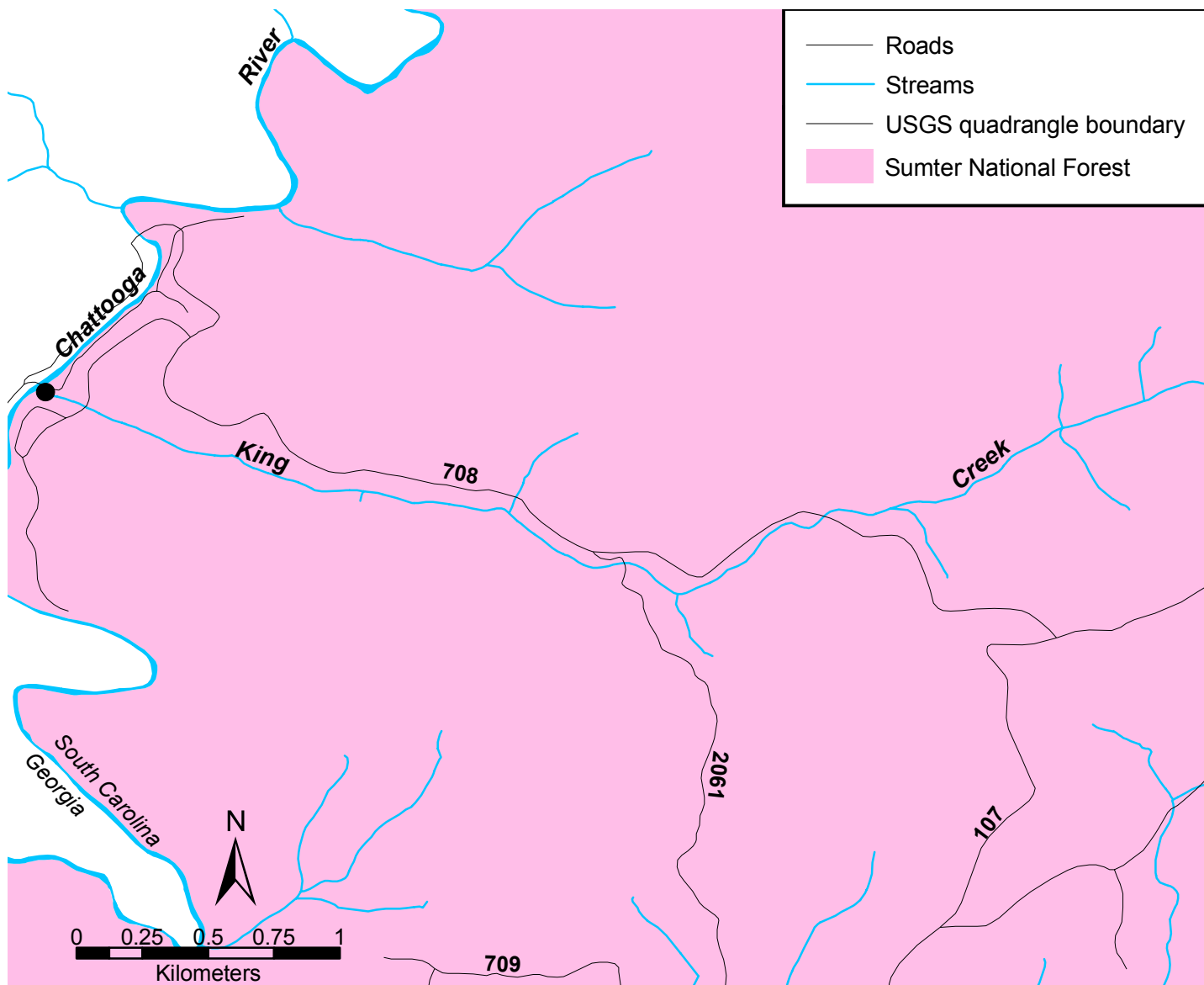


Distribution and abundance of LWD, distribution of substrates, and distribution of Rosgen channel entrenchment in Jacks Creek, summer 2002. LWD, and substrate, were recorded for each habitat unit in the stream. Entrenchment measurements were recorded only where calibration measurements (paired samples) were made. X-axis indicates distance upstream from confluence with East Fork of the Chattooga River.

LWD figure: Vertical bars represent total count of LWD (all sizes). Open circles represent the amount of the total LWD that was >5 m in length, >55 cm in diameter (size 4 only).

Substrate figure: Closed circles are dominant substrates, open circles are subdominant substrates. See Appendix A for substrate sizes.

Entrenchment figure: Vertical bars represent entrenchment ratio. Dotted reference lines delineate entrenched (1-1.4), moderately entrenched (1.41-2.2), and slightly entrenched (>2.2) channels. Entrenchment was calculated as floodprone width divided by bankfull width (see Rosgen 1996).



Location of habitat survey starting point (closed circle) for King Creek, summer 2001.

Stream:	King Creek
District:	Andrew Pickens
USGS Quadrangle:	Tamassee
Survey Date:	08/06/01
Downstream Starting Point:	Confluence with Chattooga River
Total Distance Surveyed (km):	4.9

	Pools	Riffles
Percent of Total Stream Area:	30	70
Total Area (m ²):	5383±602	12532±2414
Correction Factor Applied:	1.32	1.00
Number of Paired Samples:	10	22
Total Count:	115	204
Number per km:	23	41
Mean Area (m ²):	47	61
Mean Maximum Depth (cm):	44	26
Mean Average Depth (cm):	23	13
Mean Residual Depth (cm):	5	--
Percent Surveyed as Glides:	44	--
Percent Surveyed as Runs:	--	41
Percent Surveyed as Cascades:	--	22
Percent with Substrate > 35% Embedded:	--	--

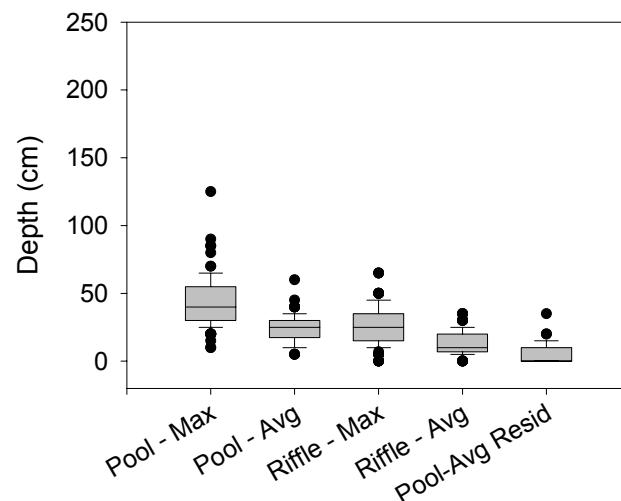
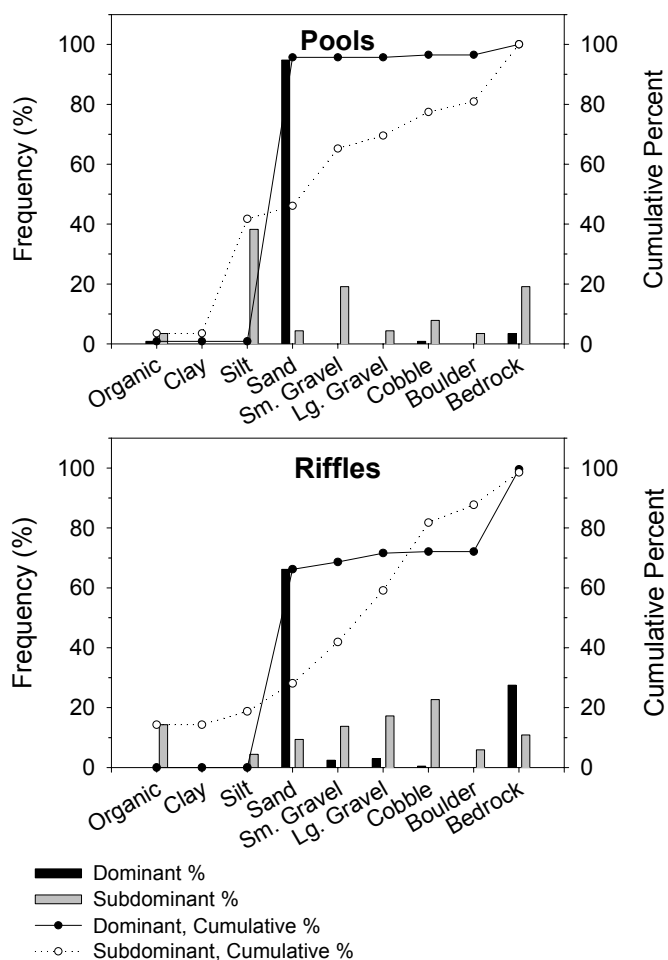
Large Woody Debris Size	Pieces per km
< 5 m long, 10 cm – 55 cm diameter:	172
< 5 m long, > 55 cm diameter:	6
> 5 m long, 10 cm – 55 cm diameter:	132
> 5 m long, > 55 cm diameter:	10
Total:	318

	Riparian Width* (m)	Bankfull Width (m)	Flood Prone Width** (m)	Entrenchment Ratio***	Gradient (%)	Water Temperature (C)
Mean	--	5	--	--	3	15
Maximum	--	9	--	--	12	16
75 th Percentile	--	6	--	--	4	15
Median	--	5	--	--	2	15
25 th Percentile	--	4	--	--	2	14
Minumum	--	3	--	--	1	13
Sample Size	0	31	0	0	30	10

* grouped left and right riparian width together for calculations

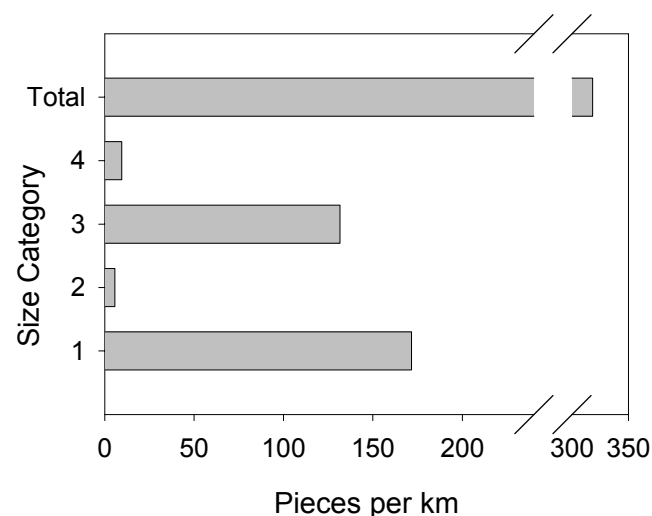
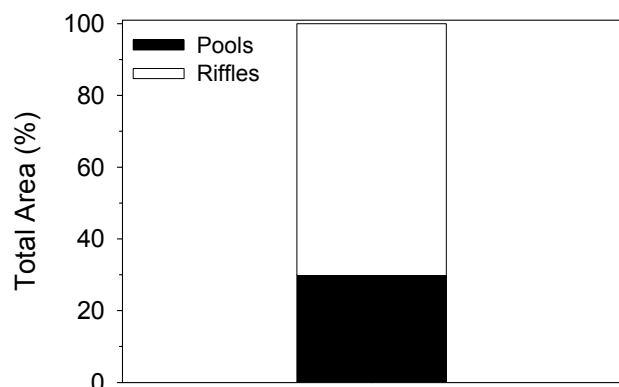
** left riparian, right riparian, and bankfull channel widths were added together for calculations

*** calculated as floodprone width divided by bankfull width



Maximum and average depths and residual pool depths for pools and riffles in King Creek, summer 2001. The top and bottom of the boxes represent the 25th and 75th percentiles, the bar in the center of the box represents the median, whiskers represent the 10th and 90th percentiles, and closed circles represent the entire range of the data.

Frequency (percent) and cumulative percent of dominant and subdominant substrate occurrence for pools and riffles in King Creek, summer 2001.



LWD per kilometer in King Creek, summer 2001. Y-axis labels are LWD size classes described below.

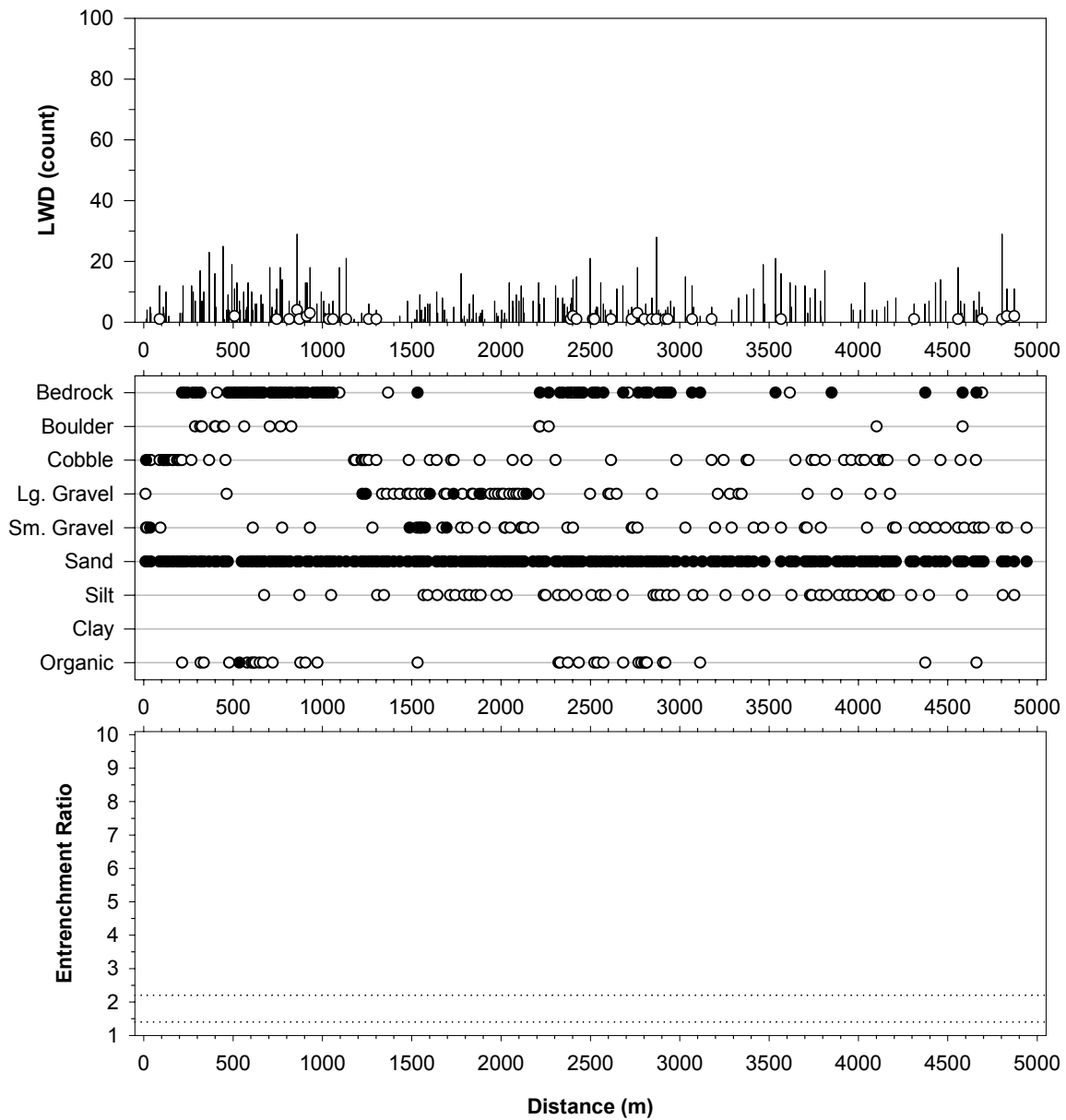
- Size 1: < 5 m long, 10-55 cm diameter
- Size 2: < 5 m long, > 55 cm diameter
- Size 3: > 5 m long, 10-55 cm diameter
- Size 4: > 5 m long, > 55 cm diameter

Estimated area of King Creek in pools and riffles as calculated using BVET techniques, summer 2001.

Stream features found on King Creek during BVET habitat survey, summer 2001. Distance is meters from start of survey.

Stream Feature	Distance (m)	Width (m)	Comments
Bridge	13.0		foot trail bridge; height = 2m; trail on left and right of stream are eroding
Trail	63.0		foot path to campsite on right
Trail	104.0		foot trail
Trail	109.0		foot trail
Trail	130.0		foot trail
Bridge	166.0		foot trail bridge
Trail	169.0		start foot trail on left
Culvert	177.0		end of campsite on left
Break	203.0		bedrock shelf
Trail	232.0		foot trail on both sides of stream
Gauging Station	239.0		end campsites on right
Trail	288.0		foot trail
Bridge	403.0		FootHills Trail Bridge; height = 1.5m
Break	466.0		bedrock shelf; height = 70cm
Island	493.0		starts
Island	508.0		ends
Island	511.0		starts
Island	518.0		ends
Trail	561.0		foot trail eroding on right
Waterfall	562.0	4.5	height = 2m
Waterfall	579.0	5.0	height = 120cm
Tributary	685.0		on left; intermittent
Island	693.0		starts on right
Island	699.0		ends
Island	767.0		starts
Island	769.0		ends
Island	851.0		starts
Island	854.0		ends
Island	854.0		starts
Island	858.0		ends
Waterfall	930.0		height = 41m
Island	1295.0		starts; possible tributary
Tributary	1422.0		on left
Island	1567.0		starts
Island	1573.0		ends
Island	1627.0		starts
Island	1636.0		ends
Tributary	1657.0	1.5	on left
Tributary	1713.0	0.5	on left
Island	1933.0		starts
Island	1939.0		ends
Tributary	1940.0		on right
Island	2009.0		starts
Island	2017.0		ends
Island	2027.0		starts
Island	2031.0		ends
Island	2082.0		starts
Island	2098.0		ends
Bridge	2210.0		foot trail bridge; height = 85cm
Island	2410.0		starts
Island	2414.0		ends

Tributary	2500.0	5.0	on right
Island	2559.0		starts
Island	2569.0		ends
Island	2600.0		sand and gravel bar
Island	2615.0		starts
Island	2635.0		ends
Island	2645.0		starts
Island	2651.0		ends
Island	2651.0		starts on left
Island	2657.0		ends on left
Island	2714.0		boulder island
Waterfall	2801.0	10.0	height = 7.7m
Waterfall	2816.0	2.0	
Tributary	2929.0		on left
Culvert	3144.0	3.0	height = 2m; concrete base
Island	3245.0		starts
Island	3252.0		ends
Trail	3303.0		foot trail on left leading to campground
Campground	3314.0		road leads to campground
Trail	3355.0		foot trail on left
Trail	3376.0		foot trail on left
Tributary	3379.0		on left
Tributary	3431.0	1.0	on right
Island	3663.0		starts
Island	3668.0		ends
Tributary	3850.0	3.0	on left
Tributary	3919.0	1.5	on right
Tributary	4069.0	2.0	on right; steep gradient
Gully	4076.0	1.0	
Tributary	4108.0	3.0	on left; same width as main channel
Tributary	4458.0	4.0	on left; narrows to 2m wide
Island	4486.0		starts
Island	4494.0		starts
Island	4508.0		ends
Island	4502.0		ends
Tributary	4721.0	3.0	on right
Tributary	4930.0		on right; flood plain area fed by 2m wide cascade extending 200-250m up embankment
Island	4933.0		starts on right; no visible ending

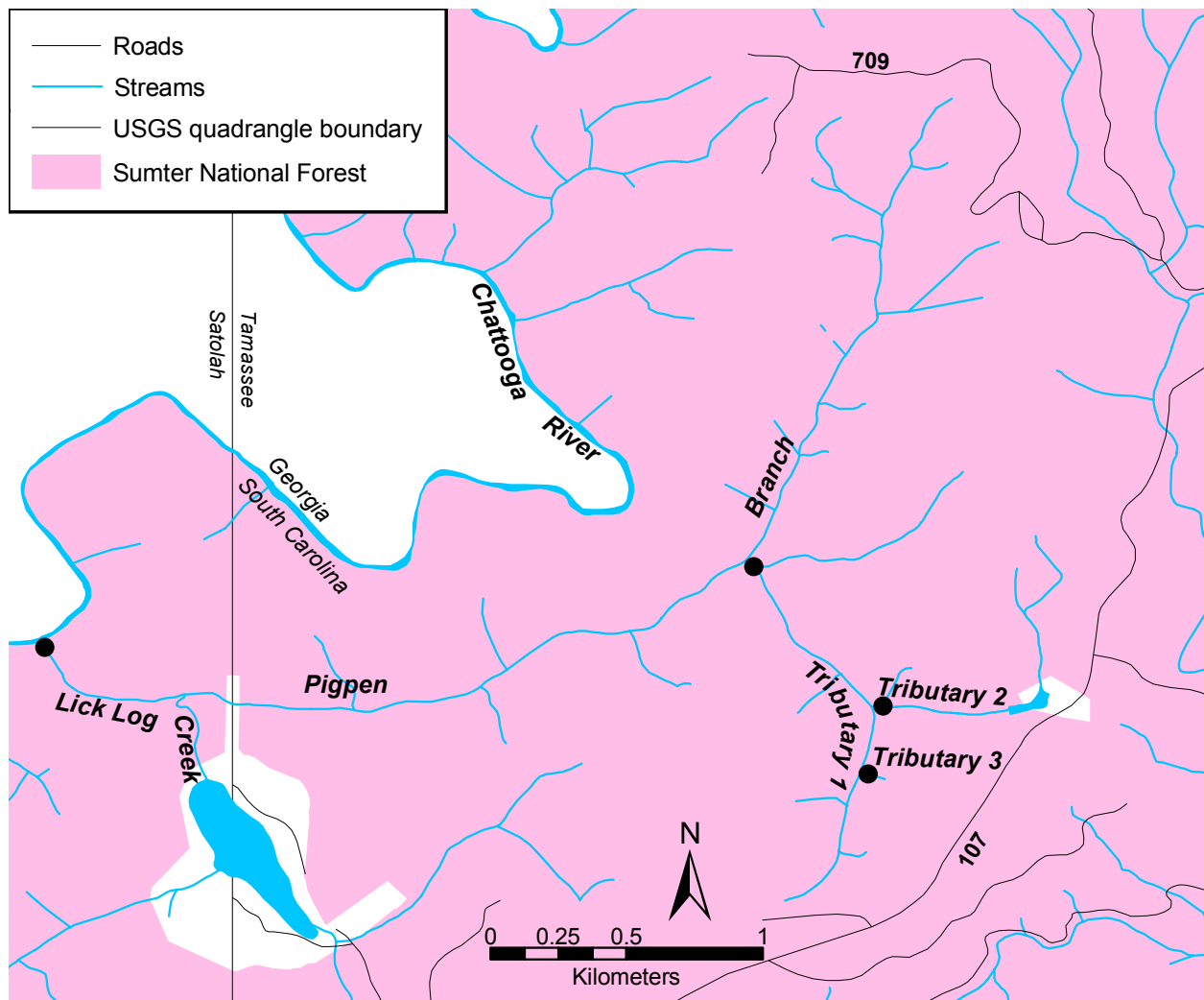


Distribution and abundance of LWD, distribution of substrates, and distribution of Rosgen channel entrenchment in King Creek, summer 2001. LWD, and substrate, were recorded for each habitat unit in the stream. Entrenchment measurements were recorded only where calibration measurements (paired samples) were made. X-axis indicates distance upstream from confluence with Chattooga River.

LWD figure: Vertical bars represent total count of LWD (all sizes). Open circles represent the amount of the total LWD that was >5 m in length, >55 cm in diameter (size 4 only).

Substrate figure: Closed circles are dominant substrates, open circles are subdominant substrates. See Appendix A for substrate sizes.

Entrenchment figure: Entrenchment not recorded.



Location of habitat survey starting points (closed circles) on Pigpen Branch, Tributary 1 Pigpen Branch, Tributary 2 Pigpen Branch, and Tributary 3 Pigpen Branch, summer 2002.

Stream:	Pigpen Branch
District:	Andrew Pickens
USGS Quadrangle:	Tamassee
Survey Date:	07/16/02
Downstream Starting Point:	Confluence with Chattooga River – note that stream is actually called Lick Log from Chattooga River to confluence with Pigpen Branch
Total Distance Surveyed (km):	5.0

	Pools	Riffles
Percent of Total Stream Area:	31	69
Total Area (m ²):	4770±269	10660±1600
Correction Factor Applied:	1.02	1.09
Number of Paired Samples:	14	9
Total Count:	134	108
Number per km:	27	22
Mean Area (m ²):	36	99
Mean Maximum Depth (cm):	35	21
Mean Average Depth (cm):	20	9
Mean Residual Depth (cm):	7	--
Percent Surveyed as Glides:	16	--
Percent Surveyed as Runs:	--	0
Percent Surveyed as Cascades:	--	7
Percent with Substrate > 35% Embedded:	13	--

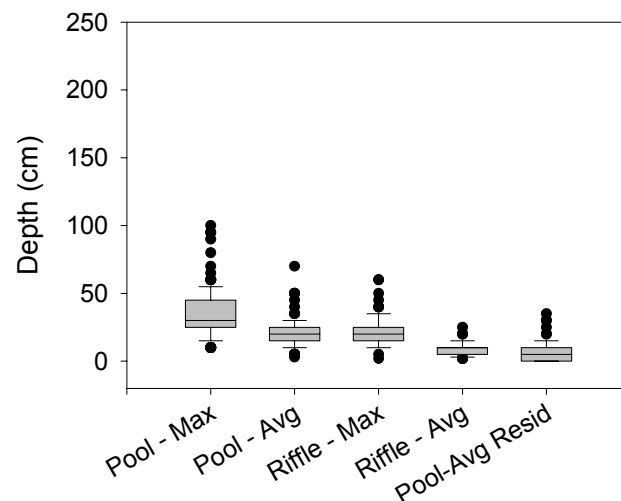
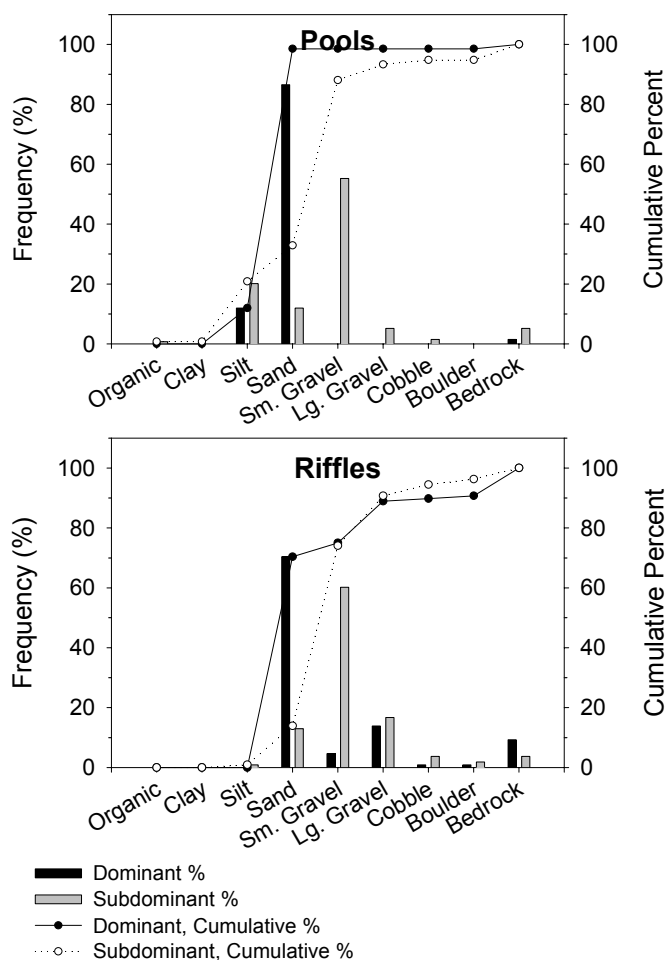
Large Woody Debris Size	Pieces per km
< 5 m long, 10 cm – 55 cm diameter:	95
< 5 m long, > 55 cm diameter:	11
> 5 m long, 10 cm – 55 cm diameter:	49
> 5 m long, > 55 cm diameter:	12
Total:	167

	Riparian Width* (m)	Bankfull Width (m)	Flood Prone Width** (m)	Entrenchment Ratio***	Gradient (%)	Water Temperature (C)
Mean	4	5	13	2.87	7	16
Maximum	13	9	22	5.17	20	17
75 th Percentile	6	5	16	3.71	6	17
Median	3	4	13	2.54	4	16
25 th Percentile	1	4	8	1.88	3	16
Minumum	0	2	5	1.53	1	16
Sample Size	20	10	10	10	12	3

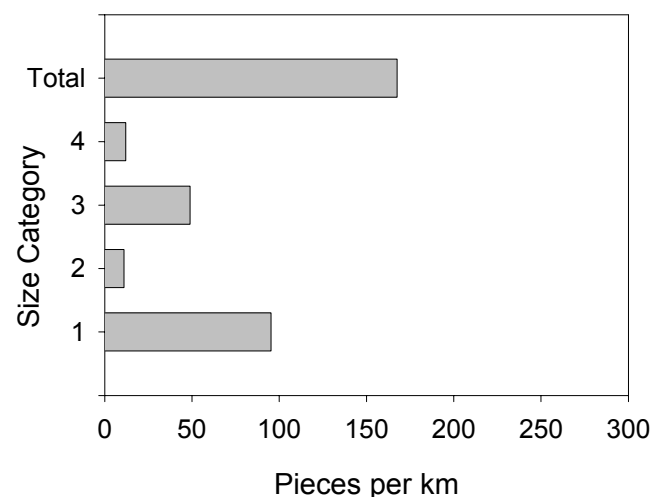
* grouped left and right riparian width together for calculations

** left riparian, right riparian, and bankfull channel widths were added together for calculations

*** calculated as floodprone width divided by bankfull width



Maximum and average depths and residual pool depths for pools and riffles in Pigpen Branch, summer 2002. The top and bottom of the boxes represent the 25th and 75th percentiles, the bar in the center of the box represents the median, whiskers represent the 10th and 90th percentiles, and closed circles represent the entire range of the data.



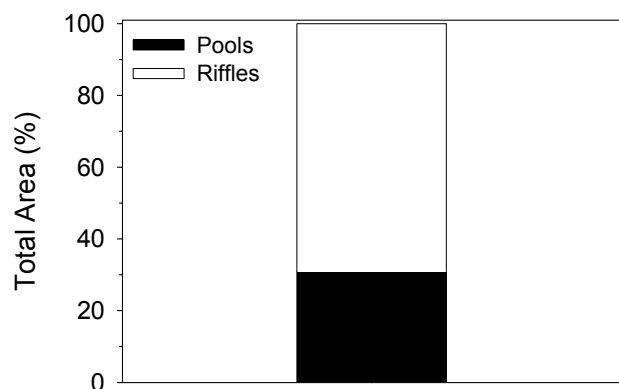
LWD per kilometer in Pigpen Branch, summer 2002. Y-axis labels are LWD size classes described below.

Size 1: < 5 m long, 10-55 cm diameter

Size 2: < 5 m long, > 55 cm diameter

Size 3: > 5 m long, 10-55 cm diameter

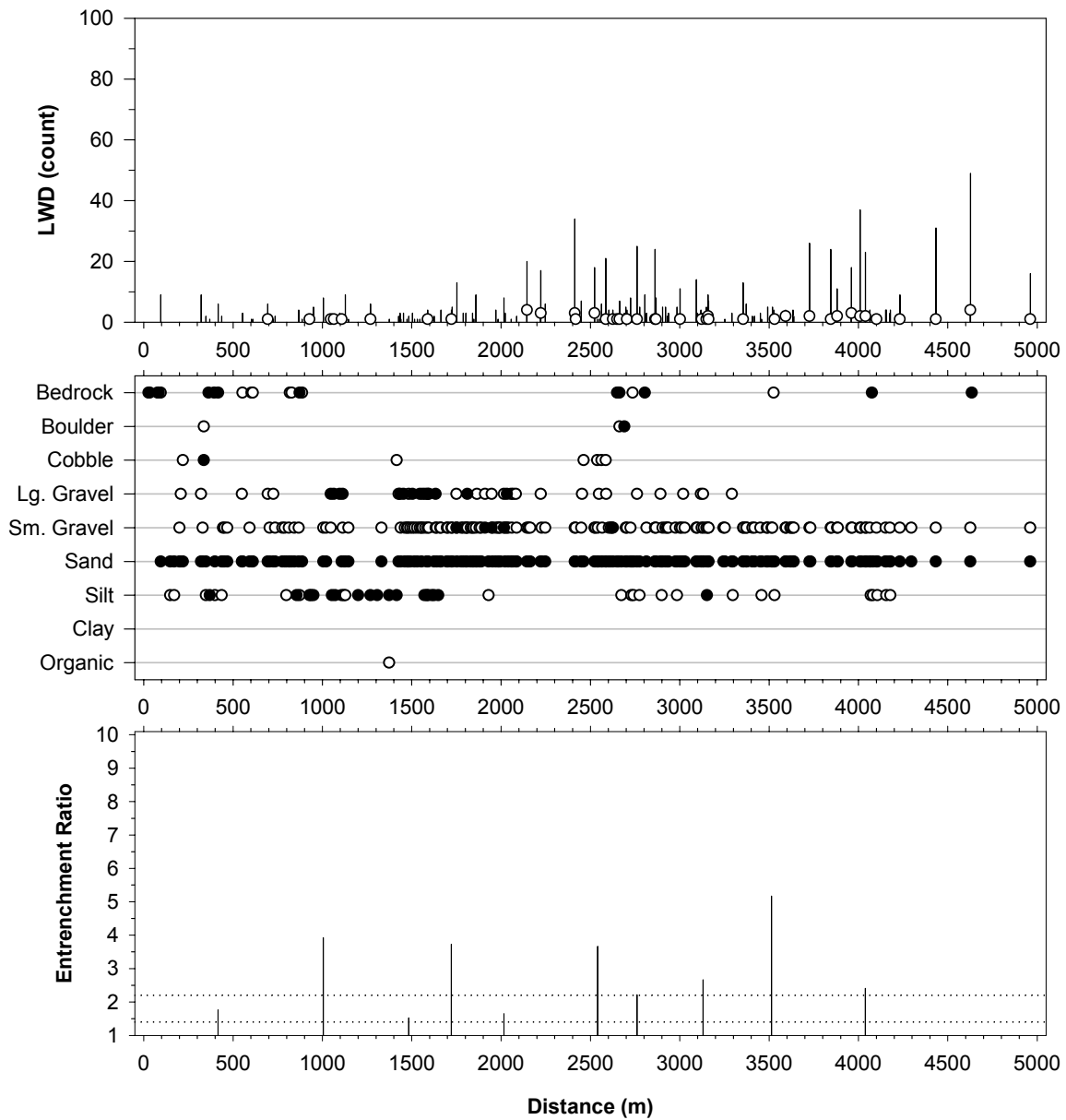
Size 4: > 5 m long, > 55 cm diameter



Estimated area of Pigpen Branch in pools and riffles as calculated using BVET techniques, summer 2002.

Stream features found on Pigpen Branch during BVET habitat survey, summer 2002. Distance is meters from start of survey.

Stream Feature	Distance (m)	Width (m)	Comments
Waterfall	78.3	6.5	
Waterfall	362.8	10.0	cascade flows down two sides with a dry area in the middle.
Seep	406.6	0.5	on right
Tributary	672.3	4.0	on right; labeled Lick Log on map
Side Channel In	968.1	1.0	on left
Side Channel Out	978.9		on left
Seep	1150.5	2.0	on right; running into previous side channel
Seep	1253.5	0.8	on left; running into following side channel
Side Channel In	1335.2	4.5	on right
Side Channel In	1491.1	0.5	on right
Side Channel Out	1500.7		on right
Seep	1546.9	0.3	on left
Seep	1767.8	0.3	on right
Side Channel In	1900.0	0.5	on right
Side Channel Out	1975.2		on right
Seep	2070.3	0.3	on left
Seep	2513.7	0.3	on left
Tributary	2513.7	1.0	on right; flat riffle continuing into a trickle
Side Channel In	2582.3	1.5	on left
Side Channel Out	2602.4		on left
Seep	2741.7	0.5	on right
Seep	2885.0	1.0	on right
Tributary	3029.0	3.5	on right and is tributary 1 on the map
Tributary	3221.2	1.0	on left
Tributary	3345.8	1.0	on left; flat, shallow riffle
Tributary	3428.2	0.5	on right; flat, shallow riffle
Seep	3712.3	1.0	on left - dry
Tributary	3920.4	1.0	on left
Waterfall	4074.7	1.0	height = 2.2m
Tributary	4140.7	1.0	on right
Tributary	4538.2	1.5	on right
Seep	4701.5	0.5	on left
Side Channel In	4748.2	0.3	on left
Side Channel Out	4762.1		on left
Seep	4753.3		on right - underground
Seep	4857.1	0.3	on right



Distribution and abundance of LWD, distribution of substrates, and distribution of Rosgen channel entrenchment in Pigpen Branch, summer 2002. LWD, and substrate, were recorded for each habitat unit in the stream. Entrenchment measurements were recorded only where calibration measurements (paired samples) were made. X-axis indicates distance upstream from confluence with Chattooga River.

LWD figure: Vertical bars represent total count of LWD (all sizes). Open circles represent the amount of the total LWD that was >5 m in length, >55 cm in diameter (size 4 only).

Substrate figure: Closed circles are dominant substrates, open circles are subdominant substrates. See Appendix A for substrate sizes.

Entrenchment figure: Vertical bars represent entrenchment ratio. Dotted reference lines delineate entrenched (1-1.4), moderately entrenched (1.41-2.2), and slightly entrenched (>2.2) channels. Entrenchment was calculated as floodprone width divided by bankfull width (see Rosgen 1996).

Stream:	Tributary 1 of Pigpen Branch
District:	Andrew Pickens
USGS Quadrangle:	Tamassee
Survey Date:	07/21/02
Downstream Starting Point:	Confluence with Pigpen Branch – only tributary shown on quadrangle, on right of stream, forks to right at confluence with tributary 2
Total Distance Surveyed (km):	1.8

	Pools	Riffles
Percent of Total Stream Area:	19	81
Total Area (m ²):	748±81	3160±493
Correction Factor Applied:	1.15	1.12
Number of Paired Samples:	6	6
Total Count:	64	61
Number per km:	35	33
Mean Area (m ²):	12	52
Mean Maximum Depth (cm):	22	11
Mean Average Depth (cm):	12	5
Mean Residual Depth (cm):	6	--
Percent Surveyed as Glides:	58	--
Percent Surveyed as Runs:	--	0
Percent Surveyed as Cascades:	--	13
Percent with Substrate > 35% Embedded:	0	--

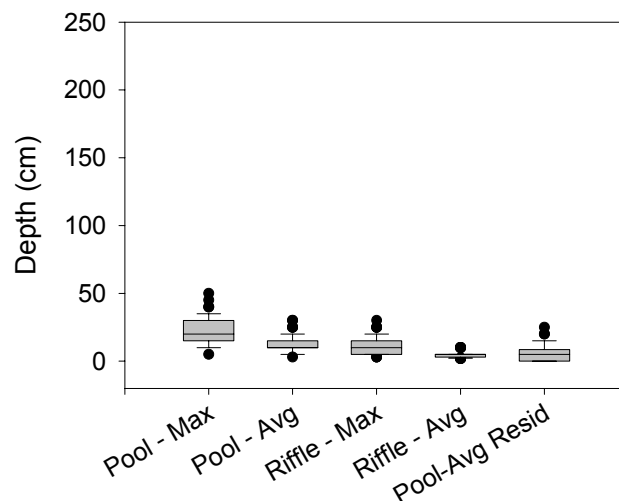
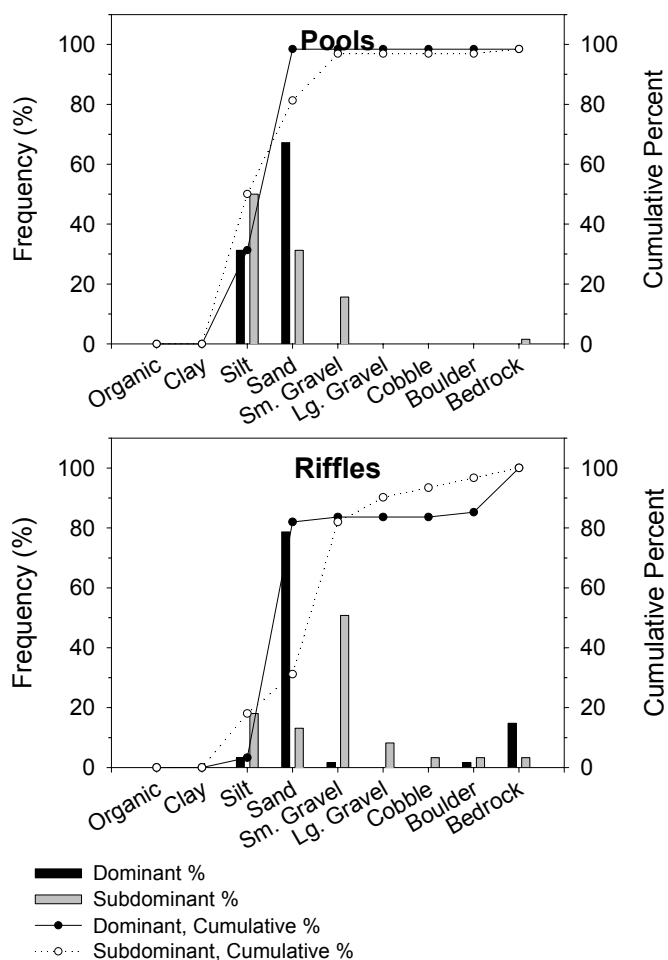
Large Woody Debris Size	Pieces per km
< 5 m long, 10 cm – 55 cm diameter:	99
< 5 m long, > 55 cm diameter:	2
> 5 m long, 10 cm – 55 cm diameter:	38
> 5 m long, > 55 cm diameter:	7
Total:	146

	Riparian Width* (m)	Bankfull Width (m)	Flood Prone Width** (m)	Entrenchment Ratio***	Gradient (%)	Water Temperature (C)
Mean	6	4	17	4.66	22	17
Maximum	16	13	29	8.27	50	17
75 th Percentile	9	4	26	6.75	36	17
Median	7	3	18	3.72	26	17
25 th Percentile	2	2	9	2.57	3	17
Minumum	1	1	3	2.29	2	17
Sample Size	12	6	6	6	10	1

* grouped left and right riparian width together for calculations

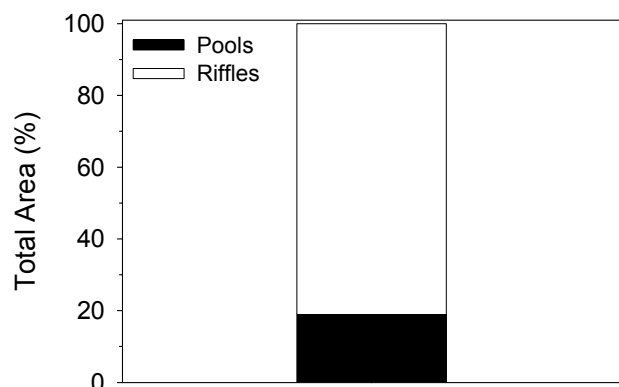
** left riparian, right riparian, and bankfull channel widths were added together for calculations

*** calculated as floodprone width divided by bankfull width

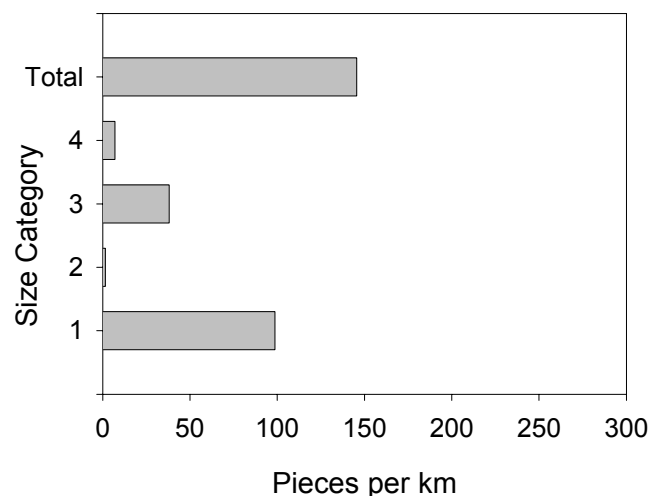


Maximum and average depths and residual pool depths for pools and riffles in Tributary 1 of Pigpen Branch, summer 2002. The top and bottom of the boxes represent the 25th and 75th percentiles, the bar in the center of the box represents the median, whiskers represent the 10th and 90th percentiles, and closed circles represent the entire range of the data.

Frequency (percent) and cumulative percent of dominant and subdominant substrate occurrence for pools and riffles in Tributary 1 of Pigpen Branch, summer 2002.



Estimated area of Tributary 1 of Pigpen Branch in pools and riffles as calculated using BVET techniques, summer 2002.

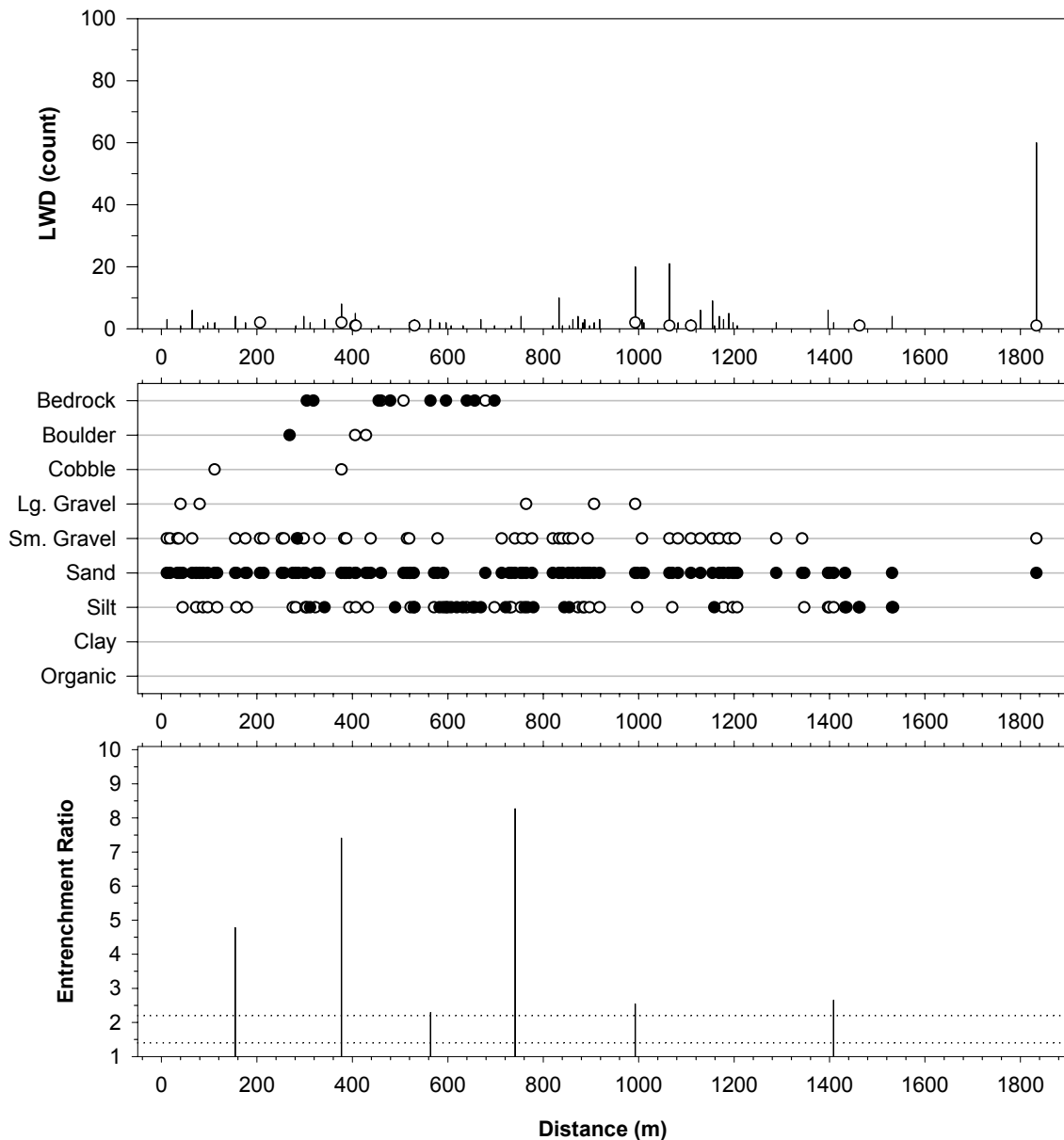


LWD per kilometer in Tributary 1 of Pigpen Branch, summer 2002. Y-axis labels are LWD size classes described below.

- Size 1: < 5 m long, 10-55 cm diameter
- Size 2: < 5 m long, > 55 cm diameter
- Size 3: > 5 m long, 10-55 cm diameter
- Size 4: > 5 m long, > 55 cm diameter

Stream features found on Tributary 1 of Pigpen Branch during BVET habitat survey, summer 2002. Distance is meters from start of survey.

Stream Feature	Distance (m)	Width (m)	Comments
Seep	39.0	1.5	on left
Tributary	296.8	1.5	on left
Side Channel	401.1		on right; goes underground with no exit
Fall	444.2		height = 3.5m
Tributary	590.2	0.5	on right
Tributary	752.1	1.0	on right; Tributary 2 on topo
Bedrock Break	154.7	0.3	
Bedrock Break	156.9	0.3	
Underground	808.5		starts
Underground	810.7		ends
Spring Seep	136.6		on right
Tributary	1109.5	0.5	on left
Spring Seep	1213.4	0.3	on right
Tributary	1257.3	0.5	on left
Seep	1287.6		on left
Underground	1288.2		starts
Underground	1295.6		ends
Seep	1402.6		on left
Tributary	1408.3	0.5	on left
Underground	1408.3		starts
Underground	1428.6		ends
Underground	1435.3		starts
Underground	1437.3		ends
Seep	1443.9		on left
Tributary	1511.3	0.5	on left
Seep	1527.7		on left
Tributary	1717.0		on left
Tributary	1799.6		on left - dry at headwaters



Distribution and abundance of LWD, distribution of substrates, and distribution of Rosgen channel entrenchment in Tributary 1 of Pigpen Branch, summer 2002. LWD, and substrate, were recorded for each habitat unit in the stream. Entrenchment measurements were recorded only where calibration measurements (paired samples) were made. X-axis indicates distance upstream from confluence with Pigpen Branch.

LWD figure: Vertical bars represent total count of LWD (all sizes). Open circles represent the amount of the total LWD that was >5 m in length, >55 cm in diameter (size 4 only).

Substrate figure: Closed circles are dominant substrates, open circles are subdominant substrates. See Appendix A for substrate sizes.

Entrenchment figure: Vertical bars represent entrenchment ratio. Dotted reference lines delineate entrenched (1-1.4), moderately entrenched (1.41-2.2), and slightly entrenched (>2.2) channels. Entrenchment was calculated as floodprone width divided by bankfull width (see Rosgen 1996).

Stream:	Tributary 2 of Pigpen Branch
District:	Andrew Pickens
USGS Quadrangle:	Tamassee
Survey Date:	07/31/02
Downstream Starting Point:	Confluence with tributary 1 – tributary 2 survey ends at private land/pond shown on USGS quadrangle map
Total Distance Surveyed (km):	0.5

	Pools	Riffles
Percent of Total Stream Area:	20	80
Total Area (m ²):	127±6	499±96
Correction Factor Applied:	1.15	1.12
Number of Paired Samples:	5	6
Total Count:	18	18
Number per km:	34	34
Mean Area (m ²):	7	28
Mean Maximum Depth (cm):	18	11
Mean Average Depth (cm):	9	4
Mean Residual Depth (cm):	3	--
Percent Surveyed as Glides:	72	--
Percent Surveyed as Runs:	--	0
Percent Surveyed as Cascades:	--	0
Percent with Substrate > 35% Embedded:	28	--

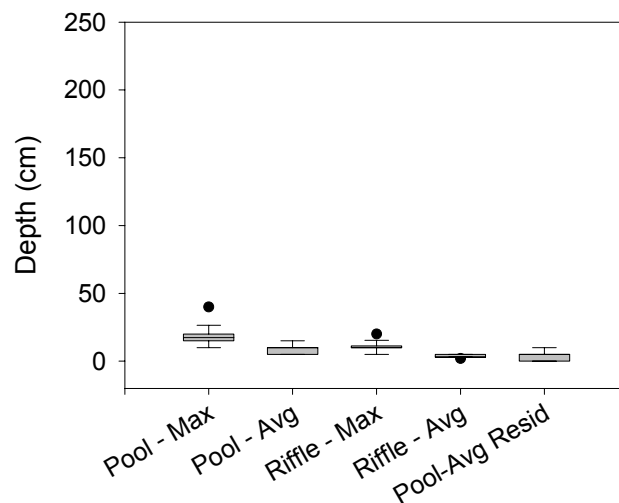
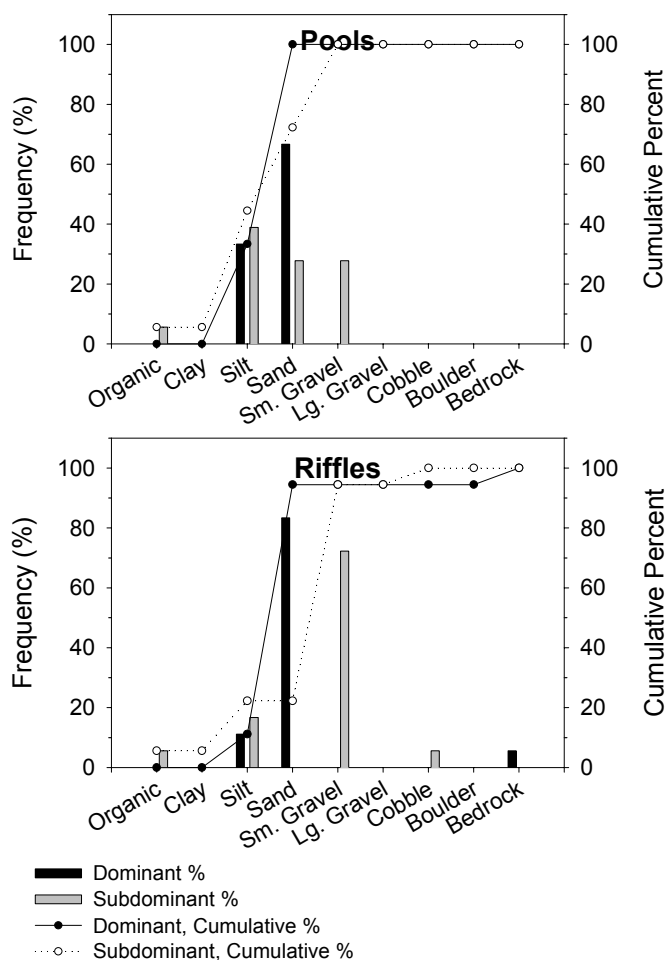
Large Woody Debris Size	Pieces per km
< 5 m long, 10 cm – 55 cm diameter:	132
< 5 m long, > 55 cm diameter:	2
> 5 m long, 10 cm – 55 cm diameter:	57
> 5 m long, > 55 cm diameter:	0
Total:	191

	Riparian Width* (m)	Bankfull Width (m)	Flood Prone Width** (m)	Entrenchment Ratio***	Gradient (%)	Water Temperature (C)
Mean	2	2	6	3.79	3	18
Maximum	8	2	11	8.41	3	18
75 th Percentile	2	2	8	5.10	3	18
Median	1	2	5	2.71	3	18
25 th Percentile	1	1	4	1.84	2	18
Minumum	0	1	3	1.48	1	18
Sample Size	11	6	6	6	6	1

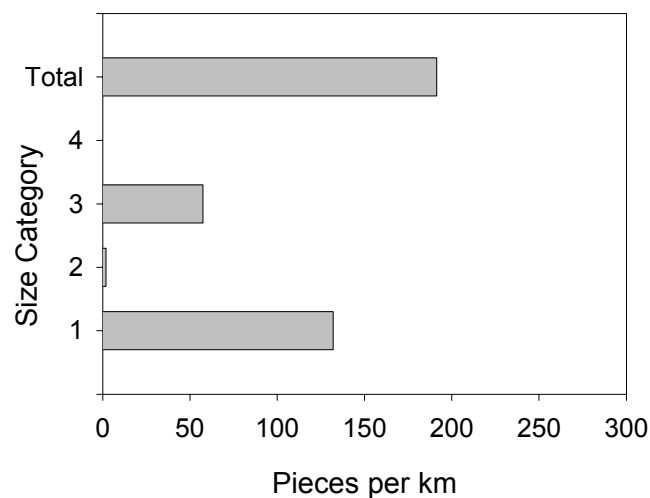
* grouped left and right riparian width together for calculations

** left riparian, right riparian, and bankfull channel widths were added together for calculations

*** calculated as floodprone width divided by bankfull width



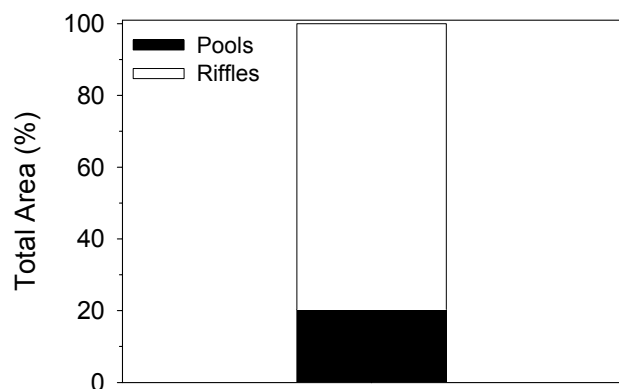
Maximum and average depths and residual pool depths for pools and riffles in Tributary 2 Pigpen Branch, summer 2002. The top and bottom of the boxes represent the 25th and 75th percentiles, the bar in the center of the box represents the median, whiskers represent the 10th and 90th percentiles, and closed circles represent the entire range of the data.



LWD per kilometer in Tributary 2 Pigpen Branch, summer 2002. Y-axis labels are LWD size classes described below.

- Size 1: < 5 m long, 10-55 cm diameter
- Size 2: < 5 m long, > 55 cm diameter
- Size 3: > 5 m long, 10-55 cm diameter
- Size 4: > 5 m long, > 55 cm diameter

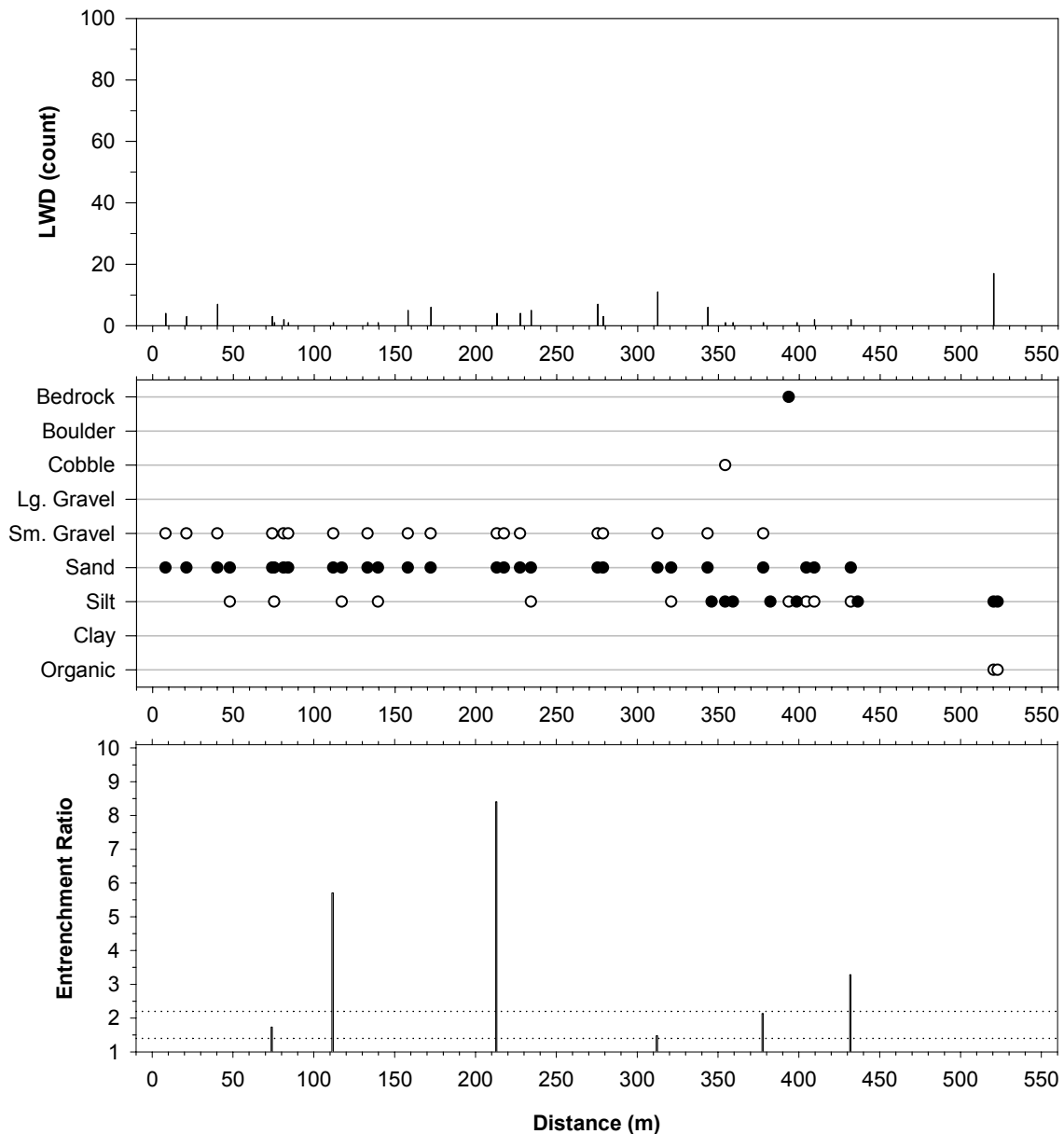
Frequency (percent) and cumulative percent of dominant and subdominant substrate occurrence for pools and riffles in Tributary 2 Pigpen Branch, summer 2002.



Estimated area of Tributary 2 Pigpen Branch in pools and riffles as calculated using BVET techniques, summer 2002.

Stream features found on Tributary 2 Pigpen Branch during BVET habitat survey, summer 2002. Distance is meters from start of survey.

Stream Feature	Distance (m)	Width (m)	Comments
Tributary	72.9	0.4	
Bedrock Break	153.5		height = 0.5m
Seep	207.5		on right
Seep	245.6		on left
Tributary	343.3	0.5	
Underground	373.1		
Underground	491.8		starts
Underground	493.3		ends
Side Channel In	516.3	0.5	on right



Distribution and abundance of LWD, distribution of substrates, and distribution of Rosgen channel entrenchment in Tributary 2 Pigpen Branch, summer 2002. LWD, and substrate, were recorded for each habitat unit in the stream. Entrenchment measurements were recorded only where calibration measurements (paired samples) were made. X-axis indicates distance upstream from confluence with Pigpen Branch.

LWD figure: Vertical bars represent total count of LWD (all sizes). Open circles represent the amount of the total LWD that was >5 m in length, >55 cm in diameter (size 4 only).

Substrate figure: Closed circles are dominant substrates, open circles are subdominant substrates. See Appendix A for substrate sizes.

Entrenchment figure: Vertical bars represent entrenchment ratio. Dotted reference lines delineate entrenched (1-1.4), moderately entrenched (1.41-2.2), and slightly entrenched (>2.2) channels. Entrenchment was calculated as floodprone width divided by bankfull width (see Rosgen 1996).

Stream:	Tributary 3 of Pigpen Branch
District:	Andrew Pickens
USGS Quadrangle:	Tamassee
Survey Date:	7/20/02
Downstream Starting Point:	Confluence with tributary 1 – this tributary is not shown on the quadrangle map, it forks to the left approximately 300 m from the confluence of tributary 1 and tributary 2
Total Distance Surveyed (km):	0.3*
*no data were recorded during survey; stream mostly underground	

Stream features found on Tributary 3 of Pigpen Branch during BVET habitat survey, summer 2002. Distance is meters from start of survey.

Stream Feature	Distance (m)	Width (m)	Comments
Underground	100.4		from 94.4 to 100.4
Underground	118.3		from 107.9 to 118.3
Underground	135.9		from 127.4 to 135.9
Underground	148.6		from 146.3 to 148.6
Underground	273.3		from 261.0 to 273.3

Appendix A: Key to habitat features identified during BVET surveys

Table A1. Description of habitat types used during BVET habitat surveys on the Andrew Pickens Ranger District, summer 2001 and 2002, modified from Armantrout (1998).

Habitat Type	Stream Bed Profile	Gradient (%)	Surface Turbulence	Water Velocity
Pool	concave	<1	none to high	low
Glide	flat	<1	none	low
Run	flat	>1	low to none	high
Riffle	convex	>1	moderate to high	high
Cascade	convex	>12%	very high	very high

Table A2. Size classes used to categorize substrate particles during BVET habitat surveys on the Andrew Pickens Ranger District, summer 2001 and 2002, based on modified Wentworth scale. Size was visually estimated on the intermediate axis (b-axis).

Size Class	Name	Size (mm)	Description
1	Organic	--	Dead organic matter, leaves, detritus, etc.
2	Clay	< 0.00024	Sticky
3	Silt	0.00024-0.0039	Slippery
4	Sand	0.0039-2	Gritty
5	Small Gravel	3-16	Sand to thumbnail
6	Large Gravel	17-64	Thumbnail to fist
7	Cobble	65-256	Fist to head
8	Boulder	>256	Larger than head
9	Bedrock	--	Solid parent material

Table A3. Size classes used to categorize large woody debris during BVET habitat surveys on the Andrew Pickens Ranger District, summer 2001 and 2002. Woody debris < 1.0 m in length or < 10 cm in diameter were omitted.

Size Class	Length (m)	Diameter (cm)
1	< 5	10-55
2	< 5	> 55
3	> 5	10-55
4	> 5	> 55

Table A4. Rosgen (1996) entrenchment classification scheme. Entrenchment is calculated as the ratio of flood prone width to bankfull channel width (i.e. flood prone width divided by bankfull channel width).

Description	Entrenchment Ratio
entrenched	<1.4
moderately entrenched	1.4-2.2
lightly entrenched	>2.2